UNITED STATES ARMY

DECEMBER 1965

AVIATION DIGEST

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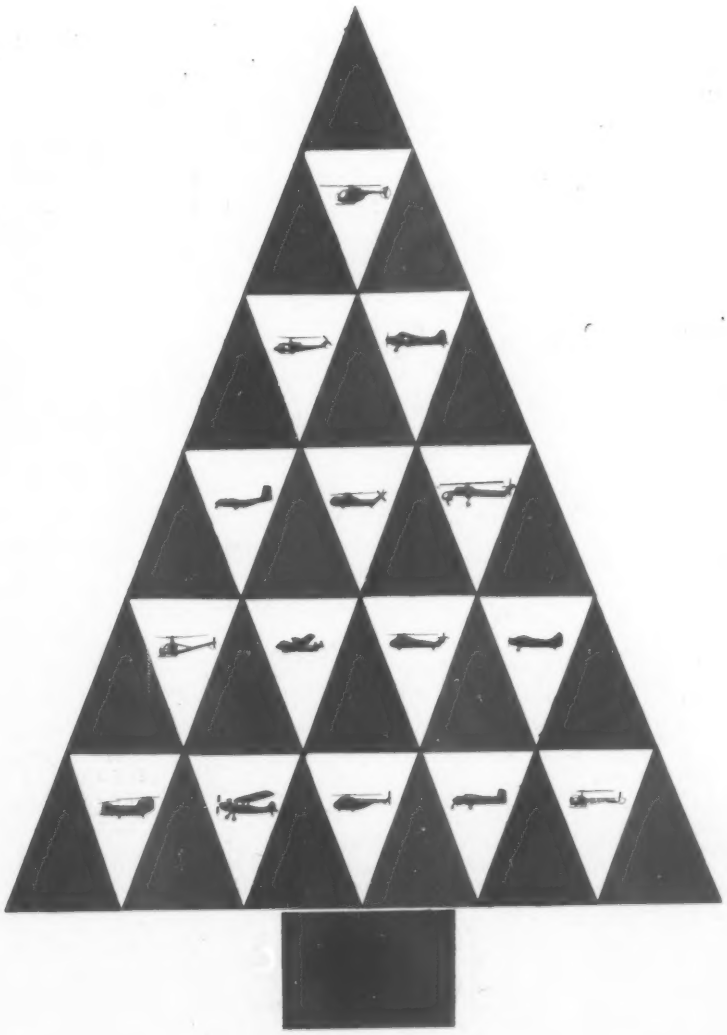

UNITED STATES ARMY AVIATION DIGEST

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DECEMBER 1965 VOLUME 11 NUMBER 12

Letters 1

The Aviation Group, Richard K. Tierney 2

Communications in an Airmobile Battalion 8
Capt Robert D. Price

Flight Fashions, Lt Col George W. Aldridge 10

AAFSS—Advanced Aerial Fire Support System 12

Know Before You Go! Capt Edward K. Lawson, III 13

Santa Learns About Flying, William H. Smith 18

Just Because 20

Airborne Surveillance, Maj James R. Barkley 26

A Merry Christmas from Horatio Frozzleforth 31
Pierce L. Wiggin

Crash Sense 35

Expansion, Col Jonathan R. Burton Inside Back Cover

Stacked Deck Back Cover

Cover: These Christmas tree ornaments symbolize aircraft supporting Army Aviation in its mission to help defend freedom and bring peace on earth, good will to men.

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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Articles, photos, and items of interest on Army Aviation are invited. *Direct communication is authorized to: Editor-in-Chief, U.S. Army Aviation Digest, Fort Rucker, Alabama.*

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LETTERS

Sir:

Having been connected with Army Aviation for only 5 years I decided that before I made up this comment sheet I would get some concensus of opinion from the experienced aviators. I also talked to personnel who have flown at a multitude of posts and learned the rules that were laid down. This is generally what I came up with:

- Flight gear is encouraged to be worn by every aviation unit commander.
- Some units *require* that the aviators wear flight clothing.
- *Not* all posts have restrictions against wearing flight gear on the post proper.
- Many posts will not allow flight clothing to be worn off the airfield.

The flight clothing issued is designed for flying. There is no belt to be caught on equipment; there are no pocket flaps and protruding buttons to get hooked to harnesses; and the flight clothing is loose with no restrictions to movement. It is designed so that no circulation of the blood will be restricted causing a sleeping of arms, legs, hands, or feet or for that matter any part of the body.

I must have talked with over 100 aviators since this Newsletter appeared and almost all of them were a little disappointed to say the least when they read the statement: "We, as aviators, are not a special class possessing any special privileges." The Army Aviation motto *"ABOVE THE BEST"* disproves this. The Army Aviator goes through the most exacting physical examination and training of any Army school. No one, I say again, *no one*, can fly an Army aircraft without going through Army flight training.

I don't care if the man had an ATR rating in civilian life and has 100,000 hours in 6-engine jets. To fly our single engine O-1A or the OH-13 he must take Army flight training. Everyone I talked to, and myself, feel that if this doesn't make us a special class then anyone should be able to fly Army aircraft. Most of them felt that it was a privilege and a tribute to be selected and rated as an Army aviator.

Why should restrictions be placed on a member of Army Aviation as to what uniform he can wear where? He works long erratic hours. He is on call to any unit commander and waits for passengers who have neglected to tell him he will be gone for 4 hours instead of the original 2 hours scheduled. He is at a strange airfield and they tell him he can't go to the "O" Club or snack bar in his flight clothing. This means he ends up eating trash for energy and gorges on coffee and Coke. Trash like candy bars, pretzels, peanut butter cookies, etc.—those items you can get out of machines. This is, of course, only if you are lucky. Most times there is only a coffee pot around. Sometimes there isn't even that.

To get to the meat and summary of the subject let's look at it this way. How come tankers can wear tankers jackets and wrap around boots anywhere? How come I can get a poncho and a blanket sewed together and wear this anywhere? This flight clothing is our duty uniform and *we* feel that there should be no more restrictions on our duty uniform than on fatigues or other duty uniforms.

The aviation advisor at all levels should bring this to the attention of the commander. The Army is always talking "esprit de corps" and unit integrity. Well, we like our job and we like everyone to know we are part of an elite well-trained group. Our "duty uniform" is neater than any of the other "special" duty uniforms. Let us show that we are part of Army Aviation and "Way Above the Best."

CAPT WORDLEY J. KLINE, JR
8th Divarty Avn Off
Baumholder Afld Cmdr
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• *The author is replying to a question found in an 8th U.S. Army Newsletter dated 10 June 1965. See page 18 for Colonel Aldridge's article "Flight Fashions."—Ed.*

Sir:

Reference the article by Captain William R. Kaler entitled "Shake Hands with Your Rescuer" (Digest, October 1965) which I read with interest and recommended to all my fellow aviators as excellent reading. I was confused by the statement, "The main point to remember is that once contact is established, it must be maintained by continually flashing the mirror on the contacted object (aircraft, ship, etc.)."

My training (I am survival equipment officer of the 135th Aviation Co. (FW-LT) at the Air Force Survival School, Stead AFB, Nevada has led me to disagree with this statement on the use of the signal mirror. Especially since the article continues to end: "When do you stop signalling? The answer: when you shake hands with your rescuer."

I feel that this statement on the use of the mirror continuously could lead to your not shaking hands with your rescuer, but instead your shaking hands with your fellow survivor, if he lives through the crash after being blinded by a mirror continuously flashed on his eyes.

Discussing this article with other fellow aviators, we are of the opinion that Air Force doctrine on the use of signal mirrors should be standard in the Army also, since there is nothing in FM 21-76 in the way of a caution to prevent the rescue pilot from blindness due to mirror flashing.

To quote AF Manual 64-3, chapter 2, page 2-11:

"Don't continue to flash the mirror in the direction of the aircraft after receipt of your signal has been acknowledged unless it appears that the rescuers have lost your position. If possible spot the mirror under a wing or toward the rear of the aircraft. *If spotted on the pilot's compartment it may blind him."*

I feel that this word of caution could perhaps prevent an accident due to mirror misuse in some future air rescue operation.

1/LT CLIFFORD C. LOWERY
Parachute & Survival Equipment Officer
135th Aviation Company (FW-LT)
10th Aviation Group
Fort Benning, Georgia

Sir:

I want to take this opportunity to compliment you on the October issue of the AVIATION DIGEST. This issue was an excellent piece of professional journalism. The editorial content, the layout, and the pictures were excellently done and speak for the professional ability of your staff.

I, as a non-flying type, have looked forward each month to the DIGEST. I feel that the DIGEST is not written just for the aviator. I believe that it gives the non-flyer a look into the cockpit of Army Aviation.

Keep up the good work.

MAJ MARVIN L. SHIRO
Public Information Officer
Fort Belvoir, Virginia 22060

The Aviation Group

Richard K. Tierney

THE AVIATION GROUP is one of the most significant "descendants" of the Army Tactical Mobility Requirements Board, which was set up in 1962 to explore new and intrepid concepts of airmobility.

To date, the Army has organized three different type aviation groups: the 11th in the 1st Cavalry Division (Airmobile), the 12th providing command and control over Army Aviation units in the Republic of Vietnam, and the 10th at Fort Benning, Ga., which is equipped to provide heavy type logistical support with its CH-47s, CV-2s and CH-54s.

Aviation group TOE vary according to assignments. For example, groups can be organized to function at division, corps, and even field army levels. Group TOE can vary according to type of division (infantry, armored, cavalry, etc.) or to its function within a corps or field army. For example, the 12th Aviation Group's main purpose is to provide command and control over a variety of Army Aviation units in a given locality. The 10th could be assigned as the aviation group in a transport brigade supporting a field army. In each case TOE would differ.

It is possible to be more specific when speaking of the 11th Aviation Group, which is tailored to support a division. It was organized in the spring of 1963 as part of the 11th Air Assault Division (T) and carried over into the 1st Cavalry Division (Airmobile) in July 1965. Containing over half the 1st Cav's aviators and aircraft, the group supplies the bulk of the division's airmobility capability, either with its assault helicopter battalions or the assault support helicopter battalion.

ASSAULT HELICOPTER BATTALIONS

Troop lift is accomplished almost entirely by the group's two assault helicopter battalions (AHB). Each has three companies of twenty UH-1D helicopters plus an aerial weapons company with twelve UH-1Bs armed with XM-16 kits (fourteen 2.75" rockets and four 7.62 mm machineguns). Effective radius for these aircraft is about 100 miles (roughly the same as the division "front"), but during maneuvers the battalions have moved out 80 miles from a base site and then ranged out another 60 miles on various missions.

Transporting troops in initial assault action is the most frequent mission assigned the battalions. Each can lift at one time the combat elements of one infantry battalion and is flexible enough to partially or completely change its operational plan after becoming airborne.

During sustained actions a battalion can be called on for resupply and/or reinforcement missions. Or it can remain on the scene up to five days with minimum resupply of food and fuel before maintenance becomes a serious problem.

Other troop lift missions performed by the battalions include pursuit actions, blocking enemy penetrations, deploying troops in defensive maneuvers, engineer missions, conducting patrols, raids

the deployment of the 1st Cavalry Division (Airmobile) and Army's significant increase in aviation units, the spotlight focuses as never before on Army Aviation. This article on the Aviation Group represents accurately the capabilities of the group organic to the 1st Cavalry Division (Airmobile), and should stimulate the imagination as to broader horizons in the area of tactical airmobility.

—Brig Gen George P. Seneff, Jr.
Director of Army Aviation

and mercy missions (see "Stacked Deck," DIGEST, Sep 1965), VIP flights, and special assignments such as infiltration, anti-infiltration, antiguerrilla and antiairborne missions.

Efficient refueling procedures and techniques have greatly enhanced the battalions' effectiveness. Originally it took 1 hour and 20 minutes to refuel 20 aircraft. But improved techniques and equipment have cut this time to less than 10 minutes.

Refueling areas can be operated either by the battalion or the companies. They are marked off into platoon areas by color-coded panels or lights corresponding to platoon colors (1st platoon, yellow; 2d, white; 3rd, green; 4th, orange). Aircraft are not shut down, but generators and all electronics are turned off as fuel is pumped from 500-gallon collapsible bags by a 20-pound, 35 gallon-a-minute pump. During 11th Air Assault operations it was not necessary to rearm while refueling, but estimates are that this would require another 10 minutes.

Generally, POL logistical policy during an operation is to

- start with all tanks full (2-3 hour supply),
- have enough fuel on the ground to service each aircraft once,
- have another reservicing supply inbound.

This system has worked well. The worst POL situation the battalions encountered in maneuvers was full tanks but no backup supply either on the ground or inbound.

When a battalion receives a mission, the commander and the supported unit generally pick out LZs and alternates. Preferably this is done by visual or photo reconnaissance, but if necessary they can be picked from a map recon.

While the LZ is being determined, as much information as possible is relayed to the battalion, which is preparing to embark and establish additional liaison with

Mobility unique to the group results in the rapid marrying of units and personnel into forces tailored for specific missions -- a requisite in airmobile operations

the supported unit. In some cases LZ information is not received until the aircraft are already en route to the objective area. If it is a night mission, pathfinders can be sent ahead to prepare the landing zone or the landing can be made in the light of flares or overhead floodlights.

Flights generally are in heavy left or right formations—depending on the distance, terrain, and LZ. Column formation is avoided to prevent having a string of aircraft flying over the same spot, but the company diamond, the heavy left or right, and the "V" or battalion wedge formations have been used.

If the flight comes under attack, a "Bandit Break"—or controlled dispersal from formation—is executed. Upon command the aircraft turn a specified number of degrees out of the formation and continue the flight under a prearranged plan until an appointed time or signal to regroup is given.

Flights to objective areas have usually been flown at about 90 knots and 10 feet above the trees. This allows the enemy little time to detect the flight, man his weapons and fire. However, flight altitude depends on the type of enemy, his defenses and terrain.

As with refueling procedures, when pathfinders are in the LZs, LZ approaches are made to colored panels or lights corresponding to platoon color codes. Personnel operating the LZ wear appropriately colored helmet liners to help direct infantrymen trained to operate by the code system.

Efficient flight and landing zone techniques, coupled with rapid refueling procedures, have enabled the battalions to accomplish missions swiftly. During maneuvers one of the battalions (making two trips) moved two entire infantry battalions 70 miles in less than 3 hours.

The battalions' weather capability depends on terrain, obstacles, and status of training of crews—to be effective in bad weather, they've got to be good. In Air Assault II, the battalions operated at ranges up to 100 miles with visibility as low as 1/2 mile and ceilings down to 50 feet. Frequently troops were delivered when parachutists could not be transported because fixed wing aircraft were grounded by weather.

Unit security is obtained much the same in the group's assault helicopter battalions (and the assault support helicopter battalion) as in division artillery units (see "Divarty Fullback," DIGEST, Jul 1965). Although the best security is mobility and the flexibility to revise a battle plan during execution, group units must make maximum use of camouflage and concealment and also be careful to set up in areas not easily located or accessible to enemy ground forces. During Air Assault II, the group's helicopter assault battalions would move into an area at dusk, making several diversionary landings before setting up. "Enemy" forces later testified that this tactic was quite effective and that they had considerable trouble locating the battalions.

Unlike the Divarty with its powerful aerial rocket battalion, the group does not pack the firepower to counterattack enemy threats. If security, such as an infantry unit, is not available to defend the battalion it is best to withdraw. The Hueys can move 3,000-4,000 meters in a matter of minutes while it would take hours for enemy ground units to cover the same distance.

While the battalions' aerial weapons companies offer but limited security in the form of a counterattack capability, they are capable of neutralizing enemy fire for the lift column. The weapons companies are equipped to operate as a unit, but usually employed as smaller-sized teams formed for specific missions. Generally they are not included in fire support plans of ground elements but stay with their lift companies.

ASSAULT SUPPORT HELICOPTER BATTALION

The ASHB consists of three companies each with sixteen CH-47A Chinook helicopters and a Hq & Hq company with three LOHs. Each Chinook is armed with two XM-24 (7.62 mm) machineguns.

The Group's Assault Helicopter Battalion is the prime

Employed in general support of the division, the battalion is primarily responsible for moving artillery, engineer equipment and supplies. It also can haul prisoners of war from forward areas, recover downed aircraft, augment aeromedical evacuation (each CH-47 carries 24 litter patients), and supplement the assault helicopter battalions by transporting troops—but not in the initial assault role unless necessary.

One CH-47 has the same lift capability as a platoon of four UH-1Ds. It carries 33 combat-equipped troops, but the number can be increased to 44 if seats are not used. Also, the Chinook is equipped with jump kits and static line hookup systems, but the payload is reduced to 24 paratroopers.

The battalion (based on 60 percent availability) can in one lift move the assault elements of two infantry battalions, or three 105 mm howitzer batteries, or more than 90 tons of cargo. Maximum effective radius of operation is about 100 to 130 nautical miles. Normal mission speed is 100 knots for Chinooks; however, the assault helicopter battalion's armed UH-1Bs cannot maintain this speed, and it is necessary for the CH-47s to slow down when armed escort is required.

When moving artillery, it normally takes eight CH-47s per battery. The 105s often are carried internally with crews while ammunition is slung under the aircraft. This is to prevent the enemy from determining what type of mission is being flown. However, it is sometimes better to sling-load the 105s so they can be quickly positioned and eliminate the need to move them over rough or muddy terrain. Also, external loads can be loaded and unloaded quicker since there is no need to tie down and then untie the cargo. Maximum capacity of the helicopter for sling loads is 12,000 pounds with full fuel.

The ASHB flies a variety of resupply missions, especially with POL. CV-2 Caribou bring the fuel into the support command area. There it is arranged in three-bag configurations (1,500 gallons) and carried forward by sling load under the Chinook.

Few missions require all the battalion's resources. Usually one company's aircraft can do the job. When a mission is received, both battalion and company liaison officers establish contact with the unit to be supported. The LZ and alternate LZs are usually selected by map reconnaissance and one aircraft leaves about 10 minutes ahead of the rest to check out the LZ. Meanwhile the remainder of the flight embarks and contacts the advance ship at a predetermined point along the route to get LZ information. Landing techniques in the LZ are similar to those of the assault helicopter battalions.

While weather and night operations have been effectively accomplished, keeping the CH-47s fueled can be a substantial task. The Chinook burns 500 to 600 gallons every 2 hours of flying. Based on 60 percent availability, twenty-eight CH-47s might well burn 50,000 gallons in an "average" combat day. If forward area refueling were used exclusively, more than 50 sorties (one sortie is one CV-2 carrying two 500-gallon drums) would be required to keep the twenty-eight CH-47s in action.

GENERAL SUPPORT AVIATION COMPANY

The aviation company is the only unit in the group, or division, with three types of aircraft: ten LOHs (currently OH-13s armed with M-2, 7.62 mm machine-gun kits); six UH-1Bs armed with XM-16s; four UH-1Ds armed with XM-23s (7.62 mm machineguns

Rapid refueling procedures enhance helicopter battalion operations

is the prime mover of artillery, engineer equipment, and supplies

mounted in the doors); three OV-1B Mohawks with side looking airborne radar (SLAR); and three OV-1Cs with infrared scanner (ir) and KA-30 camera. (These Mohawks are the only fixed wing aircraft in the division. See "1st Cavalry Division, Airmobile," DIGEST, Aug 1965.)

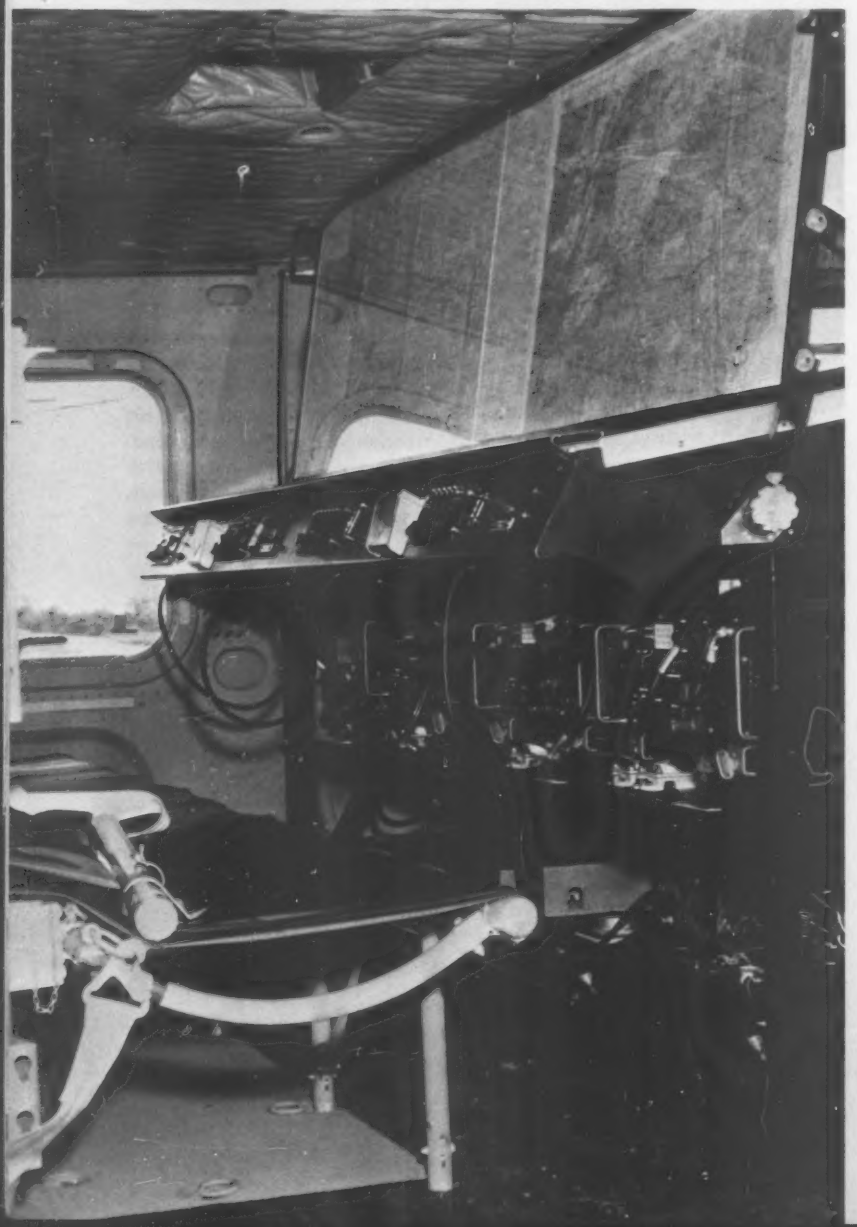
The company is responsible for providing observation, reconnaissance and surveillance, aerial command posts and relay stations, battlefield illumination, local small area smoke screens, emergency aeromedical evacuation, VIP and staff liaison type flights, a CBR capability, establishing and maintaining a division base airfield and a helipad, taking care of all flight records, and for providing aircraft for meeting all minimums and flight requirements.

An instrumented fixed wing airfield is maintained by the company in the division rear. It includes POL, tower, operations, and maintenance support. The heliport is maintained near the division main CP, and although it has a 24-hour operational capability it is not normally instrumented. Frequently during operations, the company must establish forward supporting heliports with a VFR capability and auxiliary pads to accommodate up to 12 aircraft.

During air assault tests, the company used U-6A Beavers for radio relay. However, the Beavers have been replaced with specially equipped (350 gal aux tanks) UH-1Ds which provide a flight endurance in excess of 7 hours and a radio range of over 125 miles.

UH-1Ds also are used as an airborne tactical operations center, and along with the relay ships have undergone antenna modifications. The protruding "rabbit ear" antennas presented a fade-out problem, but newly installed "belly" antennas should help the situation. Personnel riding in the TOC usually are the operations officer, the commander in charge of the operation, an intelligence officer, an Air Force liaison officer, and the fire support coordinator.

UH-1D used as airborne tactical operations center



COMMUNICATIONS

Where the standard ROAD Division relies on "miles" of wire for communications, the airmobile division turns to radio.

Since success or failure depends on the ability to communicate, the airmobile division must be able to depend on the radios used by its aerial relay and command

GAP MESSAGE FORMAT

1. a. PZ_____ b. Location_____ c. Time_____
   d. (Alt) PZ_____ e. Location_____ f. Time_____
2. a. AAU_____ (Callword, Channel, Size) b. AHB_____
3. a. AHB Plan Plat_____ b. Co_____ c. Bn_____
4. a. ASHB Plan Plat_____ b. Co_____ c. Bn_____
5. a. Mohawk Plan_____ b. Round____ c. Prep____ d. Join Column at_____
6. a. ARA Plan_____ b. Prep_____ c. Join Column at_____
7. a. 105 How Plan____ b. TOT_____ c. Length of Prep_____
   d. Fire Control_____ (Callword, Channel).
8. Cav Plan_____
9. PF_____
10. AF Support_____

11. PZ (Name & Coordinates)	12. Formation	13. Load Type	14. Acft Rqmt
a. _____	a. _____	a. _____	a. _____
b. _____	b. _____	b. _____	b. _____
c. _____	c. _____	c. _____	c. _____
d. _____	d. _____	d. _____	d. _____

15. LZ (Name & Coordinates)	16. Formation
a. _____	a. _____
b. _____	b. _____
c. _____	c. _____
d. _____	d. _____
e. _____	e. _____
f. _____	f. _____

17. H-Hour_____
18. Primary Flt Route
    a. IP_____ c. CCP_____
    b. ACP_____ d. ACP_____
    e. LRP_____
19. Alt Flight Route a. IP_____ c. CCP_____ e. LRP_____
    b. ACP_____ d. ACP_____
20. UHF Air Control Channel_____
21. REMARKS:_____

GROUND AVIATION PLAN (GAP)

Items are numbered or lettered to allow the message to be transmitted using a line item key. Only required information need be given. The message text is transmitted in the following form: "One Alpha—Red one, one Bravo—ACF 6428, one Charlie—071030R, etc."

post aircraft. These aircraft already have organic radios (one UHF and one FM) but it was necessary to acquire additional FM capabilities and a single side band (HF) to allow both voice and hard copy transmissions.

The ARC-122 FM communications packet was developed by the group and fabricated by Lexington depot to provide this additional FM capability. Each packet consists of two RT-524 radios plus necessary controls and antennas. The system is wired into the aircraft intercom system and can be installed in less than an hour by trained personnel. Where required, two systems may be interconnected providing a total of four FM channels.

The RT-524 is the basic radio used in the VRC-12 series of vehicular mounted ground radios. It was selected for use in the ARC-122 because it can operate on all current FM channels, is readily available in the division and has a considerably higher power output than the ARC-44 (35 watts as opposed to 9 watts).

The group has also developed a lightweight, mobile GCA unit consisting of a 3/4 ton truck and trailer, plus a 3/4 ton truck containing a power plant. This system (AN/TSQ-65) also was made by the Lexington Signal Depot.

The truck pulling the trailer carries a shelter which houses two TPN-9 GCA operators' positions, 3 UHF radios, two FM radios, wind measuring equipment and telephones. The entire system can occupy a position and become operational in 40 minutes. Standard TPN-8 GCA systems usually are moved in barrels and crates and take 2¼ to 2½ hours to set up.

The group has five GCA sets, each with a six man team—four operators, one radar maintenance man and one power man. During airmobile maneuvers these systems were moved an average of twice a day.

While excellent communications systems exist in the group, they would be of little value without effective radio procedures. To help assure this, the division had made good use of a technique and procedures handbook which standardizes and codes certain proved tactics and aircraft loads. Each aviator must be thoroughly familiar with the contents of the book and pass written and oral tests on it.

Based on the handbook's code system, orders and plans can be quickly and efficiently transmitted with GAP (ground-aviation plan) format (see fig.).

In 1963 senior officers establishing the 11th Air Assault Division (T) emphasized that division airmobile concepts were sound, but insisted that success would come only with unparalleled proficiency, initiative, and dedication to training. The officers and men who fashioned the 11th Aviation Group were well qualified in these traits.

Communications in an Airmobile Battalion

Captain Robert D. Price

IS THAT ALL of the equipment I have to work with?" This was my first comment as I looked at the TOE for the 228th Assault Support Helicopter Battalion. My second thought concerned the type of equipment since I recognized very little of the nomenclature. It was now my job as communications officer to become familiar with the equipment and to make the best use of it in giving the commander

and his staff adequate communications in the field.

My first consideration was air-mobility and fast movements by the entire division. This would automatically eliminate extensive wire installations within the battalion. Therefore, FM radio was to become the primary means of communication between the battalion commander and the three helicopter companies. For this we had the new VRC-46 and VRC-27 (part of the VRC-12 series), which have proved to be much more reliable than the old AN/VRC-3 through 8 series. The new equipment is more compact, has flat overlapping covers, doesn't contain the vast amount of tubes that were subject to unexpected failure, and has a good sealing factor which it retains with screws (which don't break or can be left disconnected as the old dzus could).

The AN/VRC-46 has an installed weight of 130 pounds. On low power the AN/VRC-46 and -47 have an output of 1-3 watts and on high power 35 watts, with a range of 15 miles while moving and 20 stationary. As for maintenance and troubleshooting there is no comparison to any radios other battalion size units have had in the past. It's a pleasure to troubleshoot.

Battalion headquarters would need two VRC-47 radios, one for the commander's vehicle and the other to remain in battalion headquarters. The next priority was the S-3. In a unit of this type liaison with the supported unit is very important; therefore, the last VRC-47 was assigned to the liaison officer. Now that the battalion had its radio communications, the next problem was the assignment of radios to companies.

For obvious reasons each company commander would have a VRC-47 mounted in his vehicle. Company operations must have adequate communications to maintain control of the aircraft for missions. So they received two VRC-46 radios, to be operated from a rectifier in the operations tent. The last FM radio, a vehicular mounted VRC-47, was assigned to the operations officer.

This then is the total FM communications of the battalion, excluding the installed radios in each of the 48 aircraft. Assuming now that the battalion is in the field, let's eavesdrop on what might be a typical series of transmissions.

"Alpha 3, this is Hotel 3. Over . . . Hotel 3, this is Alpha 3. Over . . . 3, mission for four Blackfish to support lift of Edgewood from Alpha Bravo at 1715Z for coordination. Over . . . Roger, will need one Blackfish from Bravo to support mission. Over . . . Roger 3, break. Bravo 3 this is Hotel 3. Over . . . This is Bravo 3, monitored transmission will have one Blackfish at Alpha's position at 1700Z. Over . . . Roger Bravo, break. Alpha 3 did you hear Bravo? Over. Roger Hotel 3. Over . . . This is Hotel 3. Out . . ."

I know what you are thinking: the procedure is atrocious. To be sure, it is not in the communications manuals that way. Because of the abundance of radio traffic and limited frequencies, it has been necessary to use a shorthand, conversation type of radio procedure. Discarding normal procedure has cut down on the length of all transmissions within the division, therefore relieving somewhat the already overloaded condition.

Battalion headquarters has the only long-range capability in the battalion. Two VSC-1 single side band, with teletype, are used in the aviation group operations and intelligence net. Right here is a drawback in communications: the companies have no equipment of this type, so in a tactical situation and dispersed 50 miles or more, missions may have to be sent to the companies via air courier, or relayed through other units. This is not a definite problem now, but it may turn out to be if the division is ever widely dispersed.

Aircraft control is the last area of radio communications in the battalion. Since the FM is already saturated, the VRC-24 UHF was included in the TOE for air traffic control. Four of these are in the battalion, one in each company, and one in battalion headquarters to control departing and arriving aircraft.

Having briefed you on the radios in the battalion, you may be astounded to learn that not one radio operator is assigned or authorized. The closest that we come to it is with the four air traffic controllers/radio telephone operators. I feel that in the future a radio teletype team will be added to the TOE, if for no other reason than to handle VSC-1s.

Thus far I have mentioned wire only briefly, since it will only be installed in the command post areas. The battalion will not have adequate wire to install lines to the companies, unless they are within a 3 mile radius of headquarters. Eleven and one-half miles of wire just won't go much farther, with all of the internal wire in battalion headquarters. Lines longer than that would not be feasible with the fast-moving pace of this type division. Companies have even less to contend with, having only 3½ miles. Elaborate telephone systems in this aviation battalion are definitely out; radio has become the "top dog."

Capt Price was with Co A, 228th Aslt Spt Hel Bn, 11th Air Assault Div, Ft Benning, Ga., when he wrote this article.

Flight Fashions

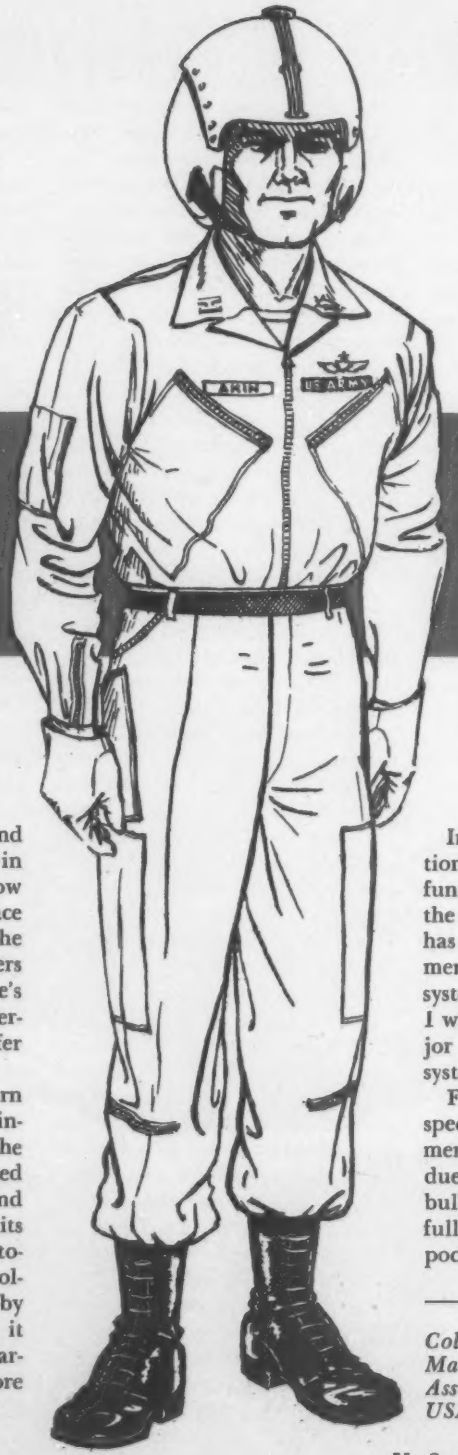
Design?

Appearance?

Style?

Material?

Shape?



Lieutenant Colonel
George W. Aldridge

IN YOUR TRAVELS around Army Aviation installations in recent years have you noticed how aviators' fashions vary from place to place? Some units favor the sage green flying suit while others go with the fatigues. Then there's the khaki, india orange, and sister-service blue for those who prefer the "continental" look.

Styles also vary. Suits are worn with or without patches and insignia, some are bloused in the boots, several units have tailored epaulets onto the shoulders, and other units wear their suits starched. If one could bring together this conglomeration of colors and configurations worn by Army Aviation crewmembers, it would probably resemble the Barnum and Bailey circus just before a command performance.

In an attempt to afford the aviation crewmember with a standard, functional and protective uniform, the USACDC Aviation Agency has submitted a small development requirement for a clothing system for aviation crewmembers. I will attempt to describe the major features and rationale of this system.

First, is there a requirement for special clothing for aviation crewmembers? The fatigue uniform, due to its pocket arrangement and bulkiness about the waist, is not fully functional during flight. Most pockets are not accessible when

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strapped in, and pocket sizes and shapes are not compatible with certain items needed during flight or in survival situations.

The fatigue uniform is not fire retardant and, therefore, offers no thermal protection. It offers little environmental protection unless supplemented with such items as jackets or parkas. So really, fatigues, as a flight uniform, do not afford the desired protection to the crewmember and are not functional when operating an aircraft. But fatigues are an excellent uniform for the ground soldier. The adoption of this uniform by the ground elements of most of our sister services attests to this fact.

Some flying suits now available to Army Aviation crewmembers are fire retardant. They offer the same environmental protection as fatigues. However, they are not uniform in configuration or color —generally unsightly, if you please. For this reason, and justly so, they are unacceptable to many commanders. Consequently, we have aviation units now wearing fatigues when fire retardant flying suits are available.

With these thoughts in mind, it was concluded that there is a requirement for special Army Aviation clothing.

The recently submitted small development requirement calls for clothing which is compatible in color, appearance, and basic function with the combat clothing of the ground soldier, and at the same time provides for safety during flight and items necessary for survival. This system will allow crewmembers the necessary degree of combat efficiency both on the ground and in the air. This clothing, when standard, will constitute the aviation crewmember's field/flight uniform.

...the USACDC Aviation Agency has submitted a small development requirement for a clothing system.

The clothing system will consist of a summer and a winter uniform to give aviation crewmembers year-round environmental protection in the aircraft and on the ground. Both uniforms will be supplemented by a jacket, gloves, and standard issue footwear and undergarments.

All components of this clothing system must be fire retardant to a degree which will provide protection from high intensity flash or flame for 10 seconds duration. This protection must last for the life of the garment.

The exterior of the garments shall be free of design features which will tend to snag or catch on protruding objects.

Pockets will be located to be accessible during flight and designed to accommodate such items as cigarettes, pencils, small flashlight, pen gun type flares and launcher, survival knife, and personal emergency radio (or transponder).

The winter uniform shall be configured along the same lines as the summer version. It will be designed so that it may be worn over the standard OD shirt and trousers *or* supplemented by liners to provide the protection in cold climates. The jacket may be the same jacket used in the summer uniform with a liner added.

Both uniform versions will have provisions to adjust sleeve cuffs to a snug fit. (No buttons, please.) Provisions will be made for ventilation adjustments during flight and for keeping the jacket and trouser legs tucked in.

Included in the clothing system will be a survival marking panel of appropriate size, shape, and color to aid in air search and rescue of downed crewmembers.

Since World War II, Army Aviation crewmembers have worn flying suits of Air Force or Navy origin. The Army Concept Team in Vietnam and many other units in the field have declared these "siren" suits unsatisfactory in that they are unsightly, not fully functional, and afford the crewmember only the minimum of environmental protection.

The Army Aviation crewmember operates in the battlefield environment at low altitudes and, a good portion of the time, on the ground. He must be capable of fighting and surviving on the ground as well as in the air. Present flight suits and coveralls are impractical in the ground role. Fatigues are not very satisfactory in the cockpit.

Present and planned aircraft cockpit configurations and auxiliary equipment, such as armor protective devices, oxygen systems, ejection seats, and survival equipment, require items of clothing which are compatible with these items and environments.

The proposed clothing "family" should meet the above requirements and at the same time be readily acceptable to all commanders. Research in fire retardant fabrics has made significant gains recently. Therefore, the system should require only a minimum amount of development effort. It is hoped that this clothing will be available to Army Aviation crewmembers in the not-too-distant future.

AAFSS

Advanced Aerial Fire Support System

THE ARMY announced that it will order development, on an expedited basis, of 10 prototype high speed helicopters designed to fire a variety of weapons.

It has selected the Lockheed-California Company of Burbank, Calif., to develop these vehicles. They will be the first helicopters conceived and designed exclusively as weapons ships.

Called the Advanced Aerial Fire Support System, the vehicle will be a radically new compound helicopter capable of cruising at speeds in excess of 200 knots—more than 50 percent faster than any other operational Army helicopter. It will be twice as fast as the armed helicopters now in action in Vietnam.

The AAFSS was designed as an integral system combining the aerial vehicle itself, avionics, weapons, and ground support equipment. It will be powered by the new 3400 hp T-64-S4A gas turbine engine developed by the General Electric Company at Lynn, Mass., under a Navy contract.

Contract negotiations will start shortly.

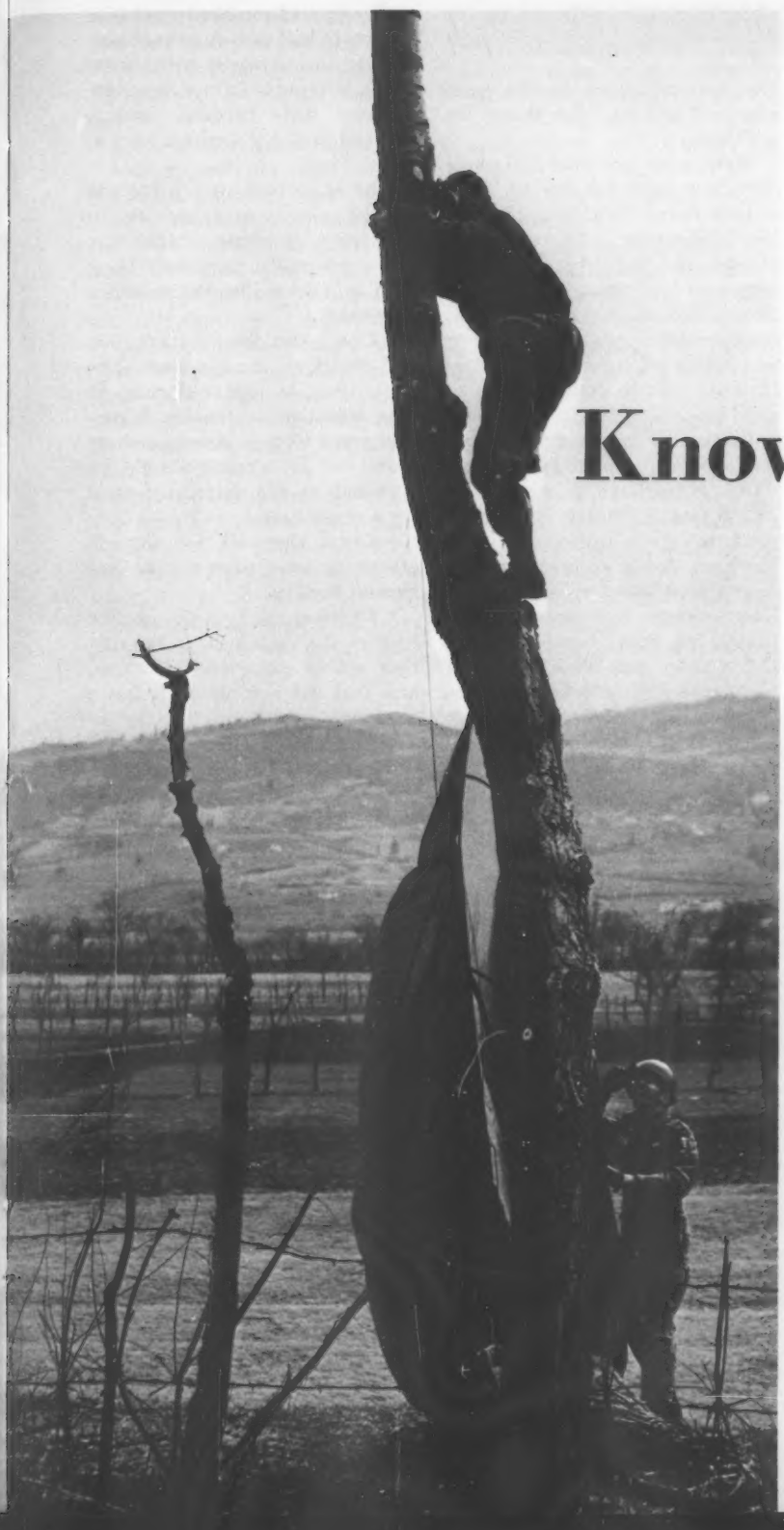
Designed to replace the Army's present armed helicopters, which were adapted from troop carriers, the AAFSS will escort troop carrying helicopters in airmobile operations and will provide suppressive fires in the landing zones.

A feature of the AAFSS is the use of Lockheed's advanced rigid rotor system; it offers a highly maneuverable, as well as an extremely stable platform, at both high and low speeds and while hovering. The advance helicopter will incorporate a thrusting pusher prop, short stubby wings and an antitorque rotor in addition to the main rotor blades.

In battle the AAFSS with its two-man crew will employ a variety of weapons including machineguns, grenade launchers, rockets, and antitank missiles.

Systems analysis and cost effectiveness studies indicate that the new system will be superior to existing helicopter weapons systems.

Selection of the Lockheed-California Company for the engineering development phase concluded a successful contract definition phase under new Department of Defense regulation. The AAFSS is the first major Army weapons system to undergo the Department of Defense development cycle which includes definition (phase 1), engineering development (phase 2), and production (phase 3).



Know Before You Go!

Captain Edward K. Lawson, III

PROBABLY THE last thing you think about before a flight is the possibility of a crash landing or bailout that will leave you in a survival situation. Under survival conditions, your chance for life depends upon your knowledge, physical ability, and will to survive. A lack of familiarity with the fundamental procedures for survival could result in death, which is a high price to pay for ignorance.

Analysis of several hundred air-

When he wrote this article Capt Lawson was an instructor, Special Subjects Div, Dept of Tactics, USAAVNS, Ft Rucker, Ala.

KNOW BEFORE YOU GO!

craft crashes and emergency parachute jumps revealed that actions taken by survivors were divided into three steps or phases: lifesaving, signaling, shelter and food. This article deals only with the lifesaving phase.

Lifesaving in air emergencies means leaving a burning or damaged aircraft as rapidly as possible. When flying, this can be done safely by parachute or by landing the aircraft; when on the ground, by getting out of the wreckage. Also included in this phase is the detection and treatment of injuries.

The lifesaving phase really begins before an emergency situation arises. Several steps can be taken before the flight that will enable you to better prepare yourself for survival. You should plan your route and then file a flight plan, and this plan must be followed! It would not help the search/rescue aircraft if you have flown to places not listed on your plan.

Take time to conduct a thorough preflight aircraft inspection including a check to see if your survival kits are aboard, complete, and serviceable. Remember, AR 95-1 states that on flights over remote terrain appropriate survival equipment must be present aboard the aircraft.

As far as proper clothing and equipment is concerned, the crew and passengers must wear clothing that is suitable for the climate and terrain over which the flight is made. Having warm clothing aboard the aircraft is not necessarily the answer to the problem; it must be with you when needed. Put the jacket on and turn down the cabin heat! Combat boots should be worn instead of low quarters; boots will stay on during the opening shock of the parachute. They are also better for walking.

Many cases are recorded where lives have been lost because individuals found themselves in a survival situation with only the clothes they were wearing. Make sure your passengers are properly dressed and are thoroughly briefed on emergency procedures. When an emergency arises, there is no time for you to explain what to do.

Because of the maneuverability and shortfield capabilities of most Army aircraft, it is emphasized that a forced landing is, in most cases, as safe as bailing out. During your flying career you may wear a parachute for thousands of hours without ever having to use it. On the other hand the next time you fly, your life may depend upon your ability to use the parachute skillfully and without hesitation. It is natural to feel some reluctance to jump since the aircraft seems to be a safe environment, but the parachute was designed to get you to the ground safely. Should the need ever arise for you to bail out—such as engine failure during night or weather flying, structural failure, or major fire—do not become unduly alarmed. Do not hesitate or you may be lost!

The B-12 back-type parachute is used in most Army aircraft for emergency jumping. Each time you check out a parachute for a flight you should inspect it for the following:

- Check the date of inspection and repack in the log book. The chute must be repacked every 60 days and have a routine inspection every 10 days. Any parachute found to be overdue should be returned to the parachute pool for a replacement.
- Check the pack for any oil, grease, or water stains; rips; and broken buckles.
- Check ripcord pins under the flap on the back-pack to see that they are in place and not bent, and that the ripcord cable has a handle.
- Check the canopy quick release assemblies for proper operation. By separating the canopy from the harness, these devices prevent high winds from dragging

the jumper on land. They can also be used when entering water to avoid becoming entangled in the canopy. To release the canopy:

Cross arms in front of chest.

Unsnap the safety clip by pulling out and down (photo 1).

Grasp both release buttons on the latch arms between thumbs and forefingers. The release will not operate unless both buttons are fully depressed (photo 2).

Pull out and down on the latch arms. Your canopy will then release. When inspecting these assemblies, you should ensure that the releases are locked in the safe position (photo 2).

After inspecting your parachute you must properly fit it. A snug, comfortable fit is desirable and can be assured by the following steps:

Note the number on the main lift web adjustment strap where it passes through the buckles on either side of the harness. These numbers must be the same on each side. If your height is 5′6″ or less, use No. 7; between 5′6″ and 6′, use No. 6; and over 6′, use No. 5.

Loosen diagonal straps.

Don harness.

Fasten chest and leg straps, giving particular attention to avoid crossing or twisting the leg straps.

Tighten leg straps.

Tighten diagonal back straps.

Adjust and tighten the chest strap.

Stow all loose ends under elastic retainers.

Once the decision to jump is made, carry out that decision immediately. Many bailout fatalities and injuries are a direct result from attempting to leave the aircraft at low altitudes. If time permits, follow these procedures:

Slow and trim the aircraft.

Tighten the parachute.

Secure helmet chin strap and unfasten microphone cord.

Jettison the door.

Unfasten lap belt and shoulder harness.

Exit aircraft by diving outward and rearward.

Once clear of aircraft, place feet and knees together with chin on the chest. Reach across the body with the right hand and grasp the D ring of the ripcord firmly. Then with a quick jerk pull the ripcord away from the body, entirely clear from its housing.

After receiving the opening shock of the parachute, approximately 2 seconds after pulling the ripcord, check the canopy for malfunctions. If the suspension lines are twisted or coming over the top of the canopy, they should be pulled back into proper position. Twist in suspension lines can be

corrected by placing hands on the inside of each set of risers and applying pressure to the sides. This same procedure will also assist in forcing a suspension line from the top of the canopy. As you descend you may experience some oscillation. This should be corrected to reduce the rate of descent and to position yourself for a landing. Reach high on one front riser and opposite rear riser, pull them down into your chest, and release slowly. This procedure may need to be repeated until the oscillation is checked.

Obstacles in the air or on the ground and lateral drift may be avoided by use of the slip (photo 3). To execute a slip, pull the two risers down into your chest in the direction you want to go. Hold them until the desired effect is obtained and release slowly to avoid oscillation. The effective ratio of slipping is approximately 250 feet of horizontal distance for each 1,000 feet of altitude.

Determine your direction of drift and turn yourself to face in that direction (photos 4 and 5). This will enable you to see any obstacle and to position yourself for a better landing. To make a left turn, grasp the right set of risers as high as possible with the right hand, and the left set of risers with the left hand. Pull both sets of risers to the front and into the chest, with the right set behind the left set. Hold until the canopy rotates and you are facing in the desired direction. Recover slowly to avoid spinning. A turn to the right is made by reversing the above procedures.

Most injuries in jumping result from incorrect landings. As in landing an aircraft, you must be in a proper "prepare to land" attitude to make a good touchdown (photo 6). In good open terrain assure this position by placing your feet and knees together, with your toes pointed downward, legs slightly bent at the knees and hips, head erect with eyes on the horizon, and hands reaching high on all four risers. This position should be assumed approximately 100 feet in the air.

When your feet hit the ground, the initial shock should be absorbed by the balls of the feet. Keeping your feet and knees together, rotate your body to the right or left to expose the remaining points of contact: calf, thigh, buttock, and shoulder muscle. Drop your chin to your chest and bring your hands and elbows in front of your head and chest, still holding onto the risers. The fall is executed in a smooth, coordinated manner with the five points of contact following one another rapidly.

In an emergency, you may not be able to pick the area upon which you make a parachute landing (photo 7). If landing in a wooded area is unavoidable, place

your feet tightly together and straight; cross your arms in front of your chest with your hands in the armpits, palms outward; and turn your head slightly to the right to protect your face and throat. Maintain this position until your descent is checked.

When forced into making a high tension wire landing, attempt to prevent your body from contacting two wires at the same time (photo 8). Place your feet and knees together, and keep legs straight. Reach up and place your

6

hands on the inside of the two front risers with fingers extended and joined. Push forward with the hands on the risers. This will assist in keeping the wires away from the body during descent. Keep your head slightly down to observe your direction of movement.

If a water landing is imminent and no survival gear is attached to your harness, rid yourself of the harness. Seat your buttocks into the saddle of the parachute harness and unfasten the chest and leg straps. When your feet hit the water, throw your arms aloft, arch your back, and slip out of the harness. With survival gear attached to the harness, you do not want to rid yourself of the harness. You should use the canopy quick releases as described earlier as your feet enter the water.

Remember these few points for escapes from disabled aircraft: know and practice emergency bailout procedures; always preflight the parachute, check the harness fit, and above all wear the parachute properly; once the decision is made to jump, don't hesitate.

7

The first few moments following a bailout or crash landing are the most crucial. Taking the wrong action or not taking the necessary action can mean the difference of surviving or not surviving.

Included as the last part of lifesaving is the detection and treatment of any injuries received during evacuation. This is very critical since many serious injuries can and do go unnoticed. These injuries must be found and treated along with any minor scratches or sprains. Any injury, no matter how small, can become a serious threat to your survival. The treatment of injuries must approach a more final type than plain first-aid, since the availability of medical assistance may be weeks away.

Phase I lifesaving is very crucial. There isn't much time to think about decisions that have to be made. Possible solutions must be deliberated before the emergency situations arise. Following proper survival procedures may end with one more life saved—YOURS!

8

Santa Learns About Flying

William H. Smith

LIEUTENANT Leber looked at his watch and grunted. It had stopped again. The watch was one of those self-winding jobs and a good one, or at least it had been a good one when he bought it several years ago in Hong Kong. But now something was wrong with the automatic winding device and he had to wind the watch by hand. The lieutenant was not the forgetful type, but after so many years he found it hard to remember to keep the fool thing wound.

He got up wearily and opened the door of the little room that served as sleeping quarters for the OD.

"Hey, Casey," he yelled at the duty NCO. "What time is it?"

"Twelve on the nose," Casey answered.

Lieutenant Leber closed the door, wound his watch, and set the hands to 12. Just at that moment, the door opened again and a rather short, fat man came in. He was dressed in a neat business suit, had a rather luxurious white beard on his face but almost no hair on his head.

"Lieutenant Leber?" he asked.

"Yes," Lieutenant Leber answered, rather surprised to have someone invade his temporary sleeping quarters.

"My name's Claus. I've some questions about flying I'd like to ask you if you have the time."

Lieutenant Leber put his watch on the table and looked at the visitor for a second. He was thinking that this had to be a joke and surely that beard was a fake.

To Mr. Claus he said, "Time's what I have the most of. Sit down, sit down."

In a very brisk and businesslike manner Mr. Claus said, "Lieutenant, I'm in the toy manufacturing and distributing business. The population explosion has given me so many new customers that I've had to modernize my delivery system. This year I'm going to use helicopters. They'll do just about everything my old equipment did —hover, sit down on roof tops, carry large numbers of toys—and in addition cover great distances quickly, which is an advantage I need very badly.

"Now my helpers have had the best training available and they've learned a good deal about winter flying. But with so much snow and ice, I'm going around to some of the more experienced fliers to seek advice. Can you give me some pointers?"

Lieutenant Leber hesitated a moment, as if he were thinking of winter flying. Actually he was looking at the beard. It was too good to be true. Perhaps if he pulled it off he could find out who was playing Santa for his benefit.

"Well, I can tell you some of the little tricks I use. I suppose

you'll have snow on your helicopters, especially if they sit outside overnight. I like to get all the snow off my machine before I warm it up. If you don't, the snow melts and water gets into places where you don't want it. Then it refreezes and you can be in trouble. The hubs of the rotors are very important in this respect.

"And take the snow off with de-icing fluid, heat, or brooms; never by chipping. Of course you'll be much better off if you take along a cover for your bubble, transmission and engine. When preheating the copter, leave the cover on to help trap the heat. This helps warm up the engine quicker."

"Let me put that down," Mr. Claus said as he pulled out a little pad and started making notes.

"What kind of heaters will you use?"

"Herman Nelson."

"Good. You made a wise choice there. One thing though. When you warm up the main reduction gear or some other part close to the cabin, you will find that the inside of the cabin tends to fog up, getting condensation on your windshield and possibly even in your instruments. To prevent this I open the door for circulation."

Continued on page 25

Just Because

We keep breaking up men and machines without rhyme or reason.

FISCAL YEAR 1965 now is part of the past. The paperwork concerning accidents has been completed and turned in, and the experts have had time to examine it to see how we did.

Statistics reveal that we are still pulling the same dumb tricks that caused us to have so many accidents in FY 1964. We sprain ankles "because" we don't look where we step, we hurt backs "because" we don't lift heavy weights the way we should, and we tear up machinery "because" we expect it to do things it's not made to do.

Why don't we stop pulling these boners? No one knows the answer. Perhaps it's "because" we don't care, or "because" we are in a hurry, or "because" we are just bored with life. The accident prevention people do know, however, that every accident has a "because." They don't just happen. And if these "becauses" were eliminated accidents would stop.

On the off chance that some of us don't know the "because" of the accidents we keep having, let's run through a few of those that happened around our airfields in FY 1965. You'll be surprised at the simple mistakes that led to damage or loss of a valuable aircraft or to days of suffering in a hospital.

Let's kick off with back injuries. By the number of back injuries we suffered last year you'd think that it was an occupational disease. Of the hundreds and hundreds of back injuries treated by Army doctors the vast majority happened "because" the injured didn't use their *heads*.

Take as an example the two mechanics who were getting ready to work on an engine mounted on a Sweeney stand. The engine and stand were against the wall and the mechanics attempted to push it out to give themselves more room to work. One of them felt a sharp pain in his back. Thirty-five days later he returned to duty.

Investigation revealed that the men were moving the engine and stand by themselves. Now sometimes it takes two or three men to move a heavy engine, but this was a light one and normally could easily be moved by two men. But in this case it was against the wall and to move it the men had to stand sideways in an awkward position. This was the "because." They should have gotten someone to help them.

There's a good chance that

these two men did not know they were doing wrong. In the accident reports for FY 1965 numerous reports suggest that we know better but don't always do right. Such is the case of an old and experienced mechanic. He knew the proper way to pick up a heavy box and during the day had picked up several. Then he reached down to pick up an empty one and strained his back. He said that he thought that "because" the box was empty and light it didn't make any difference how he picked it up.

Falls, trips, and spills accounted for many of our accidents during the last fiscal year. Almost all of them were caused by our failure to look where we step.

One mechanic stepped up on the wheel of a U-6A to put something inside. In getting down he stepped on a chock which had not been placed under the wheel properly. The mechanic spent over a week convalescing from a badly sprained ankle. Of course the chock should have been properly positioned and personnel have been so warned. But the mechanic was equally guilty "because" he didn't look where he was stepping.

In another case when servicing a U-6A the crew spilled oil on the side and wheel of the airplane. One of the crew got up on the tire to clean off the oil. When he started to get down again his foot slipped on the slick tire and he fell, hurting himself badly. Of course the cause was his stepping on the slippery tire. If he had looked where he was stepping he would have seen the oil.

A pretty secretary contributed her share to the trip and spill department statistics. She worked in a nearby hangar. While swinging past a desk her heel caught in a telephone cord and she fell flat on her face. The X-ray showed that she had broken her kneecap as well as her dignity.

One civilian employee went out to inspect erosion damage to a landing strip after a very heavy rain. This is always a good idea. Some day it may prevent a nasty accident. But this poor fellow took a long stride to avoid a mud puddle, slipped and severely strained a groin muscle. He had to have corrective surgery before returning to work.

One soldier had a long slow convalescence in a hospital "because" he tried to make a fast exit from a building. He slipped while running down some stairs and broke a leg.

Improper use of equipment caused considerable damage to an aircraft engine. No one was injured but the potential was there.

The engine was slung on a Sweeney engine stand and was being moved from the repair shop to the airfield. The driver of the truck was cautious. When he came to a bump in the road he stopped to shift down to ease his load over the bump. When he did, the airplane engine surged forward, knocked out the back window of the truck, and then turned over and fell off.

The cause was not the driver stopping. He knew he was carrying an expensive and delicate load and was trying hard to get it to the field safely. But "because" a Sweeney stand was being used for something it was not designed to do, an accident happened. It is a maintenance shop item and should not be used on trucks. It has wheels and will roll and it's top heavy and will tilt.

Lack of training and know-how accounted for many of our accidents. This was particularly so in driver training. Some of us seem to think that "because" we can drive a passenger car or a small truck we can drive just about any other small type vehicle.

But around airfields there are many special vehicles and their shifting order is arranged to fit their need. Number one reverse in one may be where number two forward is in another, etc.

One soldier found this out the hard way. He attempted to back a multipurpose vehicle out of a parking area. Instead of reverse he put it in forward gear and crashed into a civilian catering service truck delivering food stuffs.

Improper use of equipment for transportation caused considerable damage to this aircraft engine

"Because" a refueler got his vehicle too close to an airplane we had another accident. When he tried to move the truck he got the gear in reverse instead of forward and crashed into the wing, causing $400 damages.

Regulations require that refueling trucks stay 20 feet away from an aircraft. There are several reasons for this. One is the danger of fire. Another is to keep just what happened in this case from happening. The man was not trained in the proper way to drive a truck nor the proper way to refuel an aircraft.

Another case had two different "becauses." A soldier had difficulty speaking and understanding the English language. One day he was asked if he had a military driver's license. Thinking he was being asked if he knew how to drive he answered yes. He was then told to drive a military pickup parked nearby. He got in the truck, started the engine with no trouble, put it in the wrong gear and promptly crashed into a civilian vehicle nearby.

Investigation revealed that the soldier did not have a military driving permit. He knew how to drive, all right, but only cars with automatic shift. He had never used a stick shift.

The two causes here are the soldier's inability to drive and his lack of understanding. A good supervisor always makes sure he is properly understood.

One of the big "becauses" of accidents at our airfields last fiscal year was complacency. This is an old one that's hard to beat. We get used to the dangers and forget to be cautious.

Take the case of the parachute rigger who was trying to move a large floor fan to make a parachute billow. The fan was running at the time. The soldier's hand slipped into the blade, severely cutting two fingers. Of course he should have unplugged the fan before moving it.

Two soldiers who were checking for oil leaks found out about fans the hard way. They had to start the helicopter engine to build up pressure. While one was at the control the other looked for leaks. He was checking the crossover tube assembly on the irreversible valve of the fore and aft cylinder when he pricked his finger on the sharp end of a piece of safety wire. His sudden reflex action caused his hand to strike the blade of the cooling fan.

Now the "because" of this accident was not the soldier's reflex motions or the sharp safety wire. Reflex motions can't be changed. The sharp wire could have been fixed so that it wouldn't hurt someone but this is not practical in every case. The real cause is that the soldier had become so complacent that he neglected to be cautious. While making his inspection he placed his hand between the assembly and the cooling fan. He should have kept the assembly between his hand and the fan.

This business of forgetting about dangerous equipment was the "because" of a nasty accident. A mechanic was making adjustments and checking for fuel leaks on a Huey. The helicopter engine was running. The mechanic was working on the engine section on the left side of the UH-1. He left this position and walked along the left side of the tail section, evidently preparing to cross over to the right side. As he passed to the rear of the aircraft he was hit by the tail rotor.

Not looking at what you are doing is the cause of many accidents. A mechanic lifted a barrel of oil with a fork lift to fill the oil tank of a helicopter. When the tank was filled he backed the fork lift away but forgot to watch the clearance between the lift and the main rotor blade. The result was that the lift struck the underside of the main rotor blade and damaged two pockets.

A truck mounted crane was being moved by a construction worker. The boom got tangled in some electrical cable. The cable broke loose and fell across a rotor blade of a parked UH-19D. As the crane moved along, the cable dragged across the rotor blades and damaged them to the extent of $252. The operator said "because" he hadn't looked he didn't know he had hit the wire until later.

In another case a test pilot picked up an OH-23D to move it to the blade tracking area. He apparently forgot to look where he was backing and hit another helicopter, damaging both.

Because we drive a passenger car or small truck doesn't mean we can drive a special type vehicle

One airfield had two almost identical accidents within hours of each other. A mechanic was blowing up a strut on a UH-19. When he thought it was properly inflated he turned off the gas bottle and started around the aircraft to check the strut when it blew up. Investigation revealed that the shut off valve on the bottle was hard to close. Apparently the mechanic had thought he had it fully closed when he didn't.

A few hours later two mechanics were inflating the struts on another UH-19. One was manning the bottle while the other was operating the valve on the strut. The one at the strut called for the bottle to be closed and was locking down the valve lock when the strut blew.

These two blown struts cost over $3,000 but fortunately did not injure anyone. Regulators have been procured so this kind of accident can't happen again, but proper supervision would have recognized the danger before it happened.

Sometimes we have accidents "because" we don't know when to quit. Take the case of a UH-1D driver who had the same accident two times in a row. He was attempting to pick up a 1/4-ton truck equipped with a 106 recoilless rifle.

First time around he got the load 4 feet off the ground and dropped it "because" of loss of rotor rpm. He tried again and had to drop the load from 12 feet high.

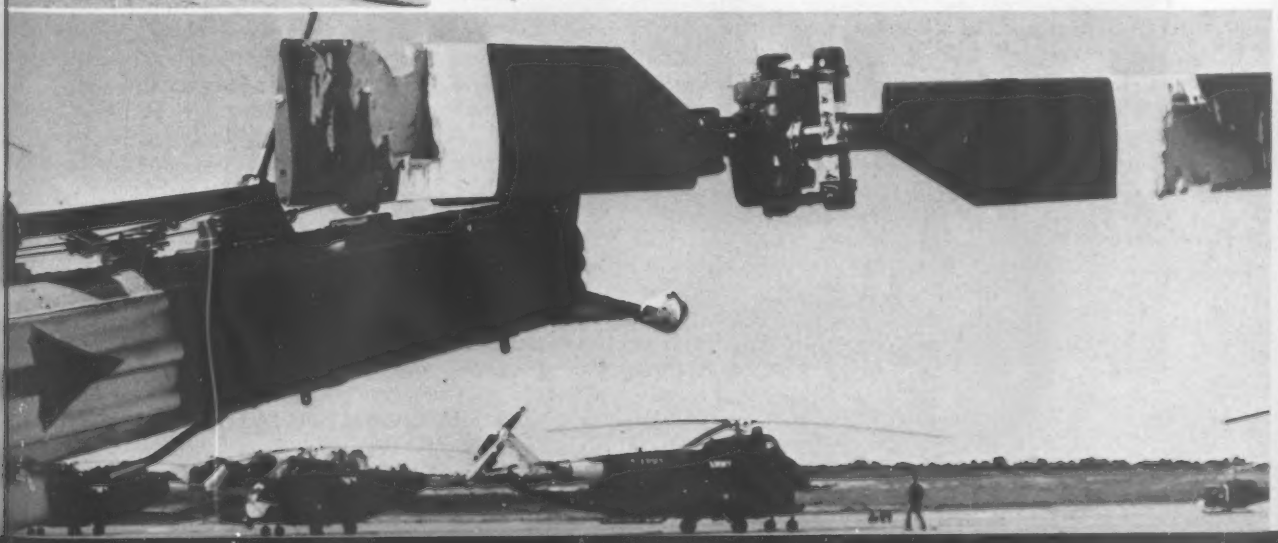
Loss of rotor rpm present in the first pickup was also present in the second. This $180 accident was due to weak engine and high density altitude.

Several accidents show that we don't always check with the medics when we should. The result is that a simple accident develops into a major one.

As an example, one mechanic was working on the left side door hinges of a UH-1 helicopter. As he moved into the cockpit to adjust the door latch his left ankle hit a towing ring, breaking the skin. He applied merthiolate to the cut but did not see a doctor. Later his ankle became inflamed and started hurting so that he could hardly walk. The doctor who eventually treated him said the complications would not have developed if the cut had been properly treated.

Loose objects lying around the airfield while engines were being tested caused some accidents. Two

Above: Complacency can cause us to walk into propellers and tail rotors. Below: Forgetting to look where he was going cause pilot of this helicopter to back into another.



mechanics were attempting to correct rear spark plug malfunction on a U-6A. The cowling had been placed under the right wingtip and had not been secured.

After the plugs had been replaced one of the mechanics started the engine to check mag. The other stood fire guard. The unsecured cowling was picked up by the blast, sucked into the propeller and deflected, hitting the fire guard.

Some of the accidents we had would be funny if they had not caused so much pain and suffering to those involved. One soldier wanted to cut off a short piece from a large hank of rope. He got a block of wood and a hatchet and promptly chopped his finger instead of the rope.

Another of our buddies spent a lot of his leisure watching TV westerns. One day he bought himself a .22 caliber target pistol and started practicing fast draws. In his excitement he shoved his pistol hard into the holster, causing it to fire accidentally. The bullet went through the holster and lodged in his right calf.

A cook closed a refrigerator door extra hard and he was promptly beaned "because" he had placed a roasting pan on top.

Usually the soldier hits the target on the firing range but there is a case of a target hitting the soldier. The man had been on range detail. He loaded up the targets, jumped on the back of the truck and told the driver to move out. When the driver did, the targets fell over and hit the soldier on the head. The cause, of course, was that the soldier had forgotten to tie down the targets.

We keep breaking up men and machines apparently for no better excuse than "Just Because."

Below and right are twin accidents. Both happened at the same airfield, the same day, and in the same way. Good supervision would have prevented them.

Loose objects lying around the airfield while testing engines cause some accidents

SANTA LEARNS ABOUT FLYING

Continued from page 19

Mr. Claus made a note, chuckled and said, "Lots of folks put sprays on their windows to make them look frosted, but I guess I don't want that on my helicopter windows."

"No, you don't," Lieutenant Leber growled as if he didn't appreciate the joke.

He continued his discussion, "Now about 2 minutes before takeoff, switch on the flight and navigation instruments to make sure they are in good working order. This is important in very cold climates. I've found that sometimes it's best to warm up the cabin with the Herman Nelson so the instruments have a better chance of being accurate."

Lieutenant Leber was still trying to figure out who was playing Santa. He thought he knew all the men in the outfit, but this fellow didn't look like any of them. He carried on, however, thinking that any minute now he'd have a chance to pull off the false beard and solve the mystery.

"If I were you, I'd pay special attention to the cargo. Make sure it's properly loaded and well tied down. Loose cargo can move around, and in tricky winter winds, unbalanced cargo can be downright dangerous — especially at low altitudes and speeds."

Mr. Claus brightened up and said, "In the old days we shipped toys unwrapped and unboxed. Now we put them in boxes, well padded and wrapped. It's a good thing we do. Loose objects would be very hard to tie down."

Lieutenant Leber continued, "Condensation can be a problem in cold weather. Water in a fuel line affects the engine operation. Water in the pitot-static tube, if it freezes, can block the line so the airspeed indicator and altimeter will give incorrect readings or fail completely.

"Keep fuel tanks filled when not flying. This helps prevent condensation. However, don't fill the tanks completely outdoors if you plan on hangaring the aircraft. The fuel may expand on warming and create a fire hazard.

"You will find it helpful to place rags in the helicopter exhaust stack as soon as it cools. (And don't forget to take them out when you start the engine.) This prevents undue amounts of cold air and moisture entering the engine through this outlet. And then watch for such things as skids and wheels freezing to ice and carbon monoxide seepage into cabins. Sometimes wheels and skids freeze so hard you can't lift them off and at other times one will come free while the other hangs on."

Lieutenant Leber thought this farce had gone far enough and it was time to act. But first he'd have to get close to this fellow. He had laid his watch on the table next to where Mr. Claus was sitting. Perhaps if he got up and looked at the watch he could get close enough without arousing suspicion. Then he could reach over and pull off the beard with one swift jerk.

Getting up he started talking about the hazards of landing in snow. "Even a helicopter sometimes has trouble in deep snow. One skid may sink farther than another and throw the copter off balance. Caution your pilots that when making a landing in a strange area not to try judging the snow depth while aloft. It's better to check with weather first to get a good average."

By this time he was alongside the table. Reaching down for his watch, he was surprised to see that it had stopped at 15 seconds past 12. As he looked it came to life.

Suddenly remembering Mr. Claus, Lieutenant Leber looked up. Mr. Claus was gone, and the door was slightly ajar. On running out of the room, all he could see was Sergeant Casey calmly reading a magazine.

"Casey, where did he go?"

"Who, sir?"

"The man who just came out of my room."

"Nobody came out of your room."

"You sure?"

"Course I'm sure. I've been here all the time."

Slowly turning back to his room, Lieutenant Leber remembered that he had to reset his watch.

"What time is it now?"

"Like I just told you, 12 on the nose. Only it's about 30 seconds past now."

"Still 12?"

"Yes, sir."

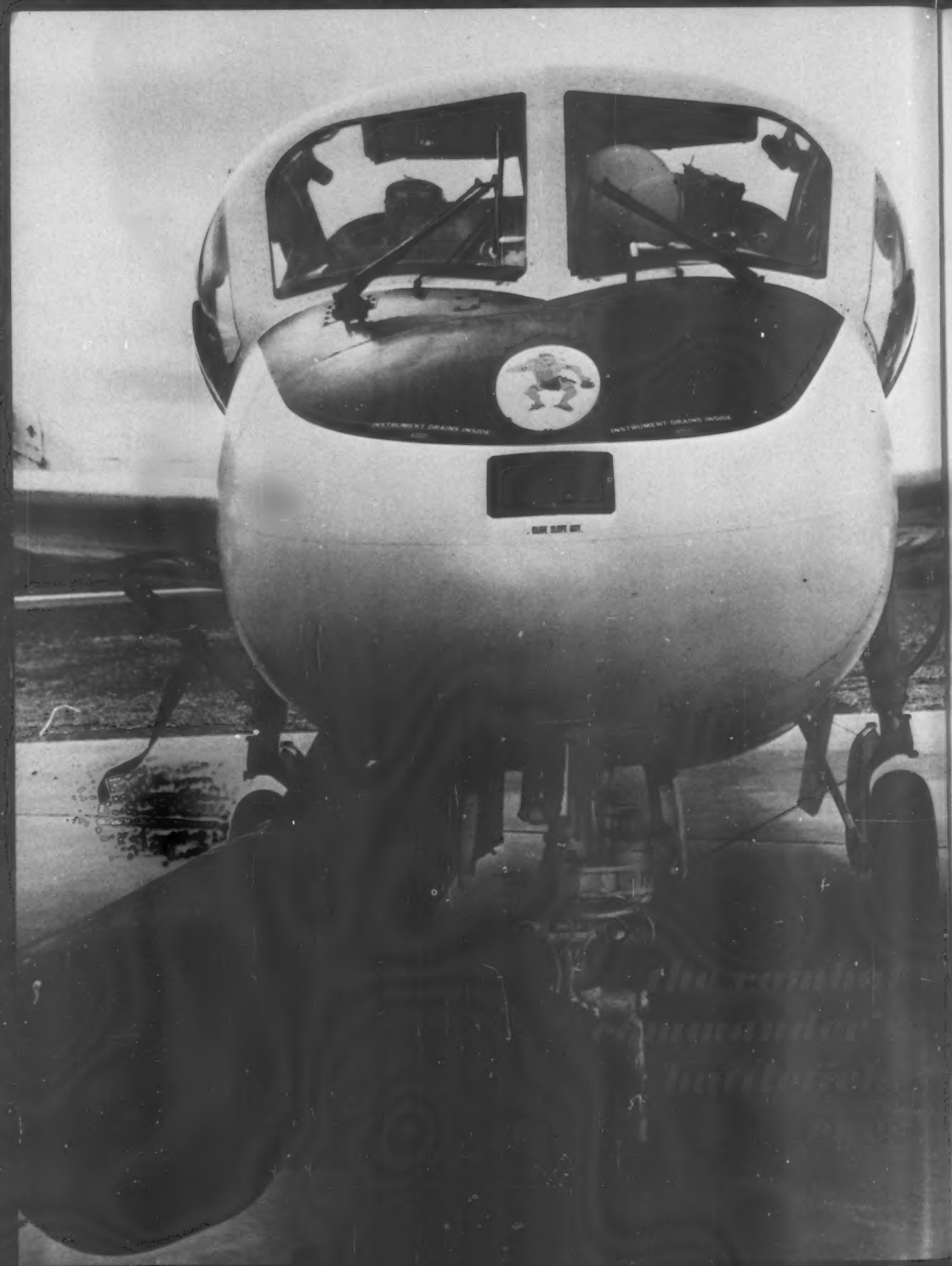
Sergeant Casey paused for a moment. Then in apparent concern he asked, "Lieutenant, are you all right?"

"Sure. Why?"

"Well, first you think someone came out of your room and no one did. Then you ask me for the time when I just told you what it was. Can I get you something—a drink of water maybe?"

"No, thank you; I'm all right."

Turning back to his room, Lieutenant Leber closed the door and went to bed. But it was a long time before he slept. He kept thinking about the 10-minute conversation he must not have had. When he did sleep, he dreamed about Santa Claus-piloted helicopters delivering toys all over the world.


INSTRUMENT DRAINS INSIDE
INSTRUMENT DRAINS INSIDE

Airborne Surveillance

Major James R. Barkley

IT WAS 0200. Steady rain drummed on the tent as the division G-2 and his G-2 Air studied the situation map. The opposing enemy armored division was deployed at the outskirts of a small town several miles to the north. The front had been quiet for three days except for considerable patrol activity. An attack by the enemy division had been expected for the past two days. The G-2 was certain that the attack would come before dawn.

Anticipating that the division would begin movement within the next three hours, the G-2 had directed that a continuous radar surveillance of the enemy division be conducted, using the OV-1B aircraft of the Airborne Surveillance and Target Acquisition (ASTA) Platoon. Employing the radar inflight processor, the sensor operator was able to continuously monitor the activities of the division while operating several kilometers behind his own "lines."

0200—Mohawk sensor operator had reported to the G-2 Air that the enemy division had not yet made any large scale move. Usual small random traffic was noted and reported.

0225—The Mohawk sensor operator reported a sudden increase in moving targets.

0230—G-2 Air had requested the immediate takeoff of an OV-1C infrared (ir) equipped aircraft. The pilot was ordered to proceed to a point just behind the forward edge of the battle area (FEBA) and hold pending further instructions.

0245—OV-1B sensor operator reported a considerable increase in traffic converging on two main arteries heading westward.

0246—The circling OV-1C was given a heading which would take the aircraft to a small town on the southern artery being used by the attacking force and several kilometers west of the lead column.

0253—OV-1C sensor operator reported that he had passed over the town at low altitude and was turning eastward to follow the highway.

0257—Now at slightly higher altitude, the OV-1C passed over a column of enemy tanks. The sensor operator reported the contact to the G-2 Air. A ground sensor operator at the ASTA Platoon airstrip also noted the contact; his data transfer system was simultaneously receiving the infrared information from the OV-1C. Four minutes later the OV-1C pilot broke off his ir surveillance run, banked to the left and headed north to pick up the second main highway.

The OV-1B, side looking airborne radar (SLAR) aircraft, meanwhile maintained a long range watch over the progress of the two columns from its standoff position behind the FEBA.

By 0310, less than 45 minutes from initial detection, the G-2 had established that the enemy had launched a major attack led by at least 50 tanks. Detection had been accomplished at night under extremely poor weather conditions. It was the result of carefully planned employment of a system organic to all divisions in the field.

A field commander's requirement for timely, accurate information regarding the strength, disposition, and activity of enemy forces is indisputable. Without it he is unable to use his own forces effectively. This requirement exists through the entire spectrum of war, from armed insurrection to all-out nuclear conflict.

TACTICAL SURVEILLANCE REQUIREMENTS

An ideal battle area surveillance system would keep the field commander informed of all enemy activity—everywhere, at all times, and in detail. In practice, surveillance is performed by sampling enemy activity—in selected areas, at intervals, in varying detail. In this manner, an adequate amount of information may be pieced together to deduce the enemy's capabilities and probable intentions. Requirements imposed on a tactical surveillance system, then, are to obtain these essential elements of information (EEI) in an orderly manner, in usable form, at minimum risk, and in time for proper action to be taken.

Ultimately the purpose of the EEI is to answer this primary question: What probable plans will the enemy use in attempting to gain the advantage in a particular area of conflict? To answer this question, full or partial answers to the following secondary questions are required.

Is the enemy making an effort to alter the status quo?

If so, what? (Detection)

Where and when? (Location)

Maj Barkley is Chief, Technical Assistance Div, U. S. Army Aircraft Maintenance Center, Sandhofen, Germany.

SURVEILLANCE

By whom and with what forces? (Identification)

Does commander have time to react? (Timeliness)

Answers to these questions result in the intelligence required by the field commander to make sound decisions. However, complete, continuous, detailed information may not be required to make a decision. A selective combination of observations will give the desired effectiveness.

The field commander, now aware of the information he needs to determine the enemy's plans, must select techniques for obtaining the information. However, all combinations of coverage and tactics do not yield the same effectiveness. The chart (fig. 1) illustrates the several paths available, the effectiveness of each, and the risk involved in each approach.

Maximum effectiveness can be obtained at very high risk. This is because the tactic employed makes the aircraft highly vulnerable to enemy defenses; however, the same effectiveness, at only moderate risk, can be obtained by using a combination of two tactics. The first tactic involves frequent scanning with SLAR, from behind friendly lines, to detect activity. This is followed by a low-level penetration and popup maneuver, using ir and photographic coverage, to locate and identify the activity. This mode of operation, in addition to reducing the risk involved, provides necessary information in time for evaluation and suitable decisions.

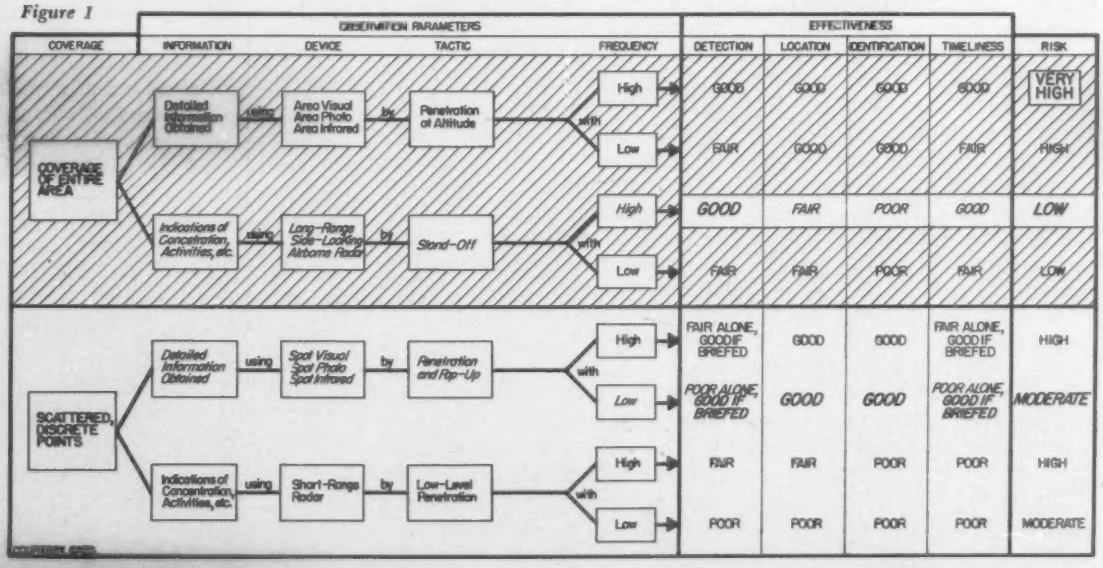
Only airborne intelligence gathering systems can maintain surveillance of a large area around-the-clock in most weather conditions. Though other intelligence gathering media will continue to be used and are necessary to the total effort, the airborne system must provide the bulk of the tactical intelligence.

Modern sensory devices have contributed to the efficiency of the airborne surveillance system. One with a most profound implication is the long range radar with moving target indication (MTI). On a single run across a division front, for example, it is possible to determine in a matter of minutes the activity throughout the entire division area of influence without penetrating the FEBA.

In fair weather, a camera equipped aircraft would be required to take a considerable number of pictures, thereby exposing the aircraft to the enemy's ground defense for a prolonged period. It would also be necessary to return to base, unload the camera, process the film, and perform a considerable amount of photo interpretation and correlation of data to obtain the overall situation that the SLAR equipped aircraft obtained in minutes. In foul weather, the information could not have been obtained within any reasonable time frame by any other method.

Infrared detection equipment in the OV-1C aircraft has the capability of passively producing imagery of excellent resolution either day or night and in some forms of precipitation. It is particularly useful in penetrating haze or smoke and in detecting camouflaged objects. The data transfer system incorporated in the

Figure 1



The objective of surveillance is to maintain continuous knowledge of the enemy in a given area of interest.

ir installation permits the infrared imagery to be observed and recorded in a ground station many miles away, limited by radio line of sight, simultaneously with that in the aircraft.

It is important that proper tactics be used to achieve desired effectiveness. It is also important that the system used be capable of performing the maneuvers required. The OV-1 Mohawk system is used in two basic mission profiles—the stand-off mission and the penetration mission.

The stand-off mission (fig. 2) is performed from behind friendly lines. Employment of an OV-1B Mohawk (equipped with SLAR) permits "seeing" into enemy territory. Air survivability is attained because the aircraft is out of range of most enemy air defense weapons.

As it patrols along the FEBA, the aircraft probes deep into enemy territory. The more often a surveillance aircraft passes a given point, the shorter the time between enemy movement and detection. This time is dependent upon the number of aircraft, speed and turning performance of the aircraft, and length of the front being patrolled. For a hypothetical front of 50 kilometers, a Mohawk could make one complete circuit in approximately 15 minutes. Slower speeds require more aircraft to maintain the same frequency of patrol, while faster aircraft tend to overshoot into adjacent division areas and spend more time in the turning maneuver.

The inflight processor-viewer provided with the SLAR permits the radar-observer to see the imagery almost immediately. If indicated he can alert the monitoring intelligence unit to the need for a closer look with a penetration aircraft or for immediate destruction by suitable weapons.

Nap-of-the-earth penetration of the FEBA, usually by an OV-1A or OV-1C aircraft characterizes the penetration mission (fig. 3). Activity reported from the stand-off mission, or other means of intelligence, can be identified or observed with the aircraft. Terrain features are used to minimize exposure and mask the progress of the aircraft to the objective area.

The Mohawk's excellent low-speed, low-altitude maneuverability allows treetop operations. This reduces its vulnerability to ground fire, usually antiaircraft guns rather than missiles.

The objective of surveillance is to maintain continuous knowledge of the enemy in a given area of interest. The greater the amount of information required or desired, the greater the risk

Figure 2. SLAR stand-off mission

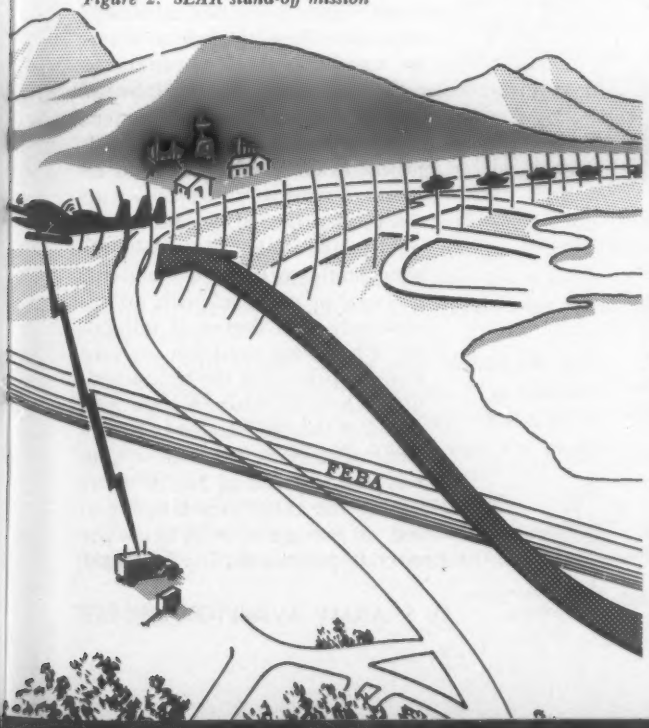
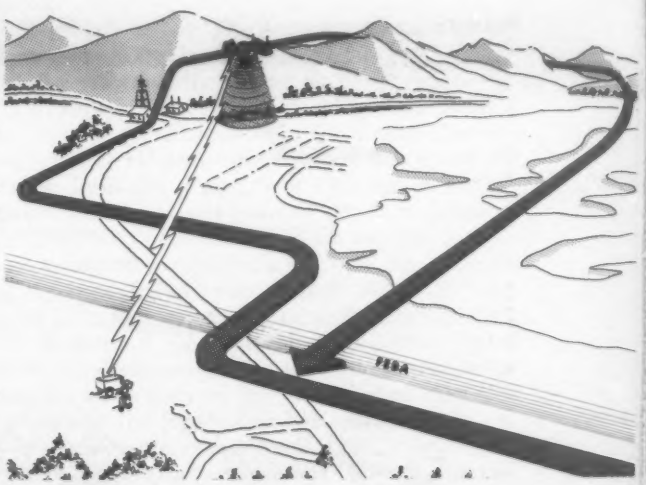


Figure 3. IR penetration mission



involved in its collection. Because all information concerning enemy activity and resources is not of equal importance, detailed information gathered in scattered, discrete areas will yield the desired level of intelligence with only moderate risk.

SURVIVABILITY

During surveillance missions, the act of "seeing" implies "being seen" in return; therefore vulnerability deserves more than passing consideration. The OV-1 gains its survivability during the standoff mission by flying over friendly territory (fig. 2). In addition, the Mohawk's low-altitude maneuverability allows it to perform at minimum altitude and safely negotiate the popup maneuver, thereby retaining a low level of vulnerability even when penetration of enemy territory is necessary (fig. 3). Although an Army surveillance aircraft does not perform the assigned mission at as high an altitude or airspeed as a high performance system, it is no more vulnerable (fig. 4).

EVALUATIONS

Because of the unique capabilities of the OV-1 system, several foreign countries have expressed an interest in procuring the system for their army forces. The first of these was West Germany. Their interest was expressed in a joint West German-U.S. Army evaluation of the entire Mohawk system. The West German evaluation indicated the true capability of the system. During an exercise involving two armored brigades, an OV-1B and an OV-1C maintained a continuous (electronic) watch over the activities of one of the brigades for approximately 24 hours without the brigade being aware that the aircraft was in the area.

The following are official conclusions extracted from the unclassified portion of the joint West German-U.S. Army OV-1 surveillance systems evaluation report.

While remaining undetected, the systems provided, within 1 hour of acquisition, the following information about a free-play maneuver:

The approach of three convoys to a staging area, exact geographical location of the convoys, approximate number of vehicles in the convoys, approximate spacing between vehicles, and their speed and direction of movement.

Deployment and identification of the vehicles in the staging area.

Tactical deployment pattern and location of the vehicles during the attack phase.

Regroupment and withdrawal of the vehicles from the area.

While remaining undetected, to ground radar defenses, the system penetrated behind antiaircraft defenses, acquired intelligence information, withdrew from simulated enemy area and returned to base.

In marine operations, the system:

Detected, located and monitored coastal shipping, including a partially submerged submarine.

Indicated speed and direction of movement of coastal shipping.

Monitored harbor, bay and canal traffic as well as dockside shipping.

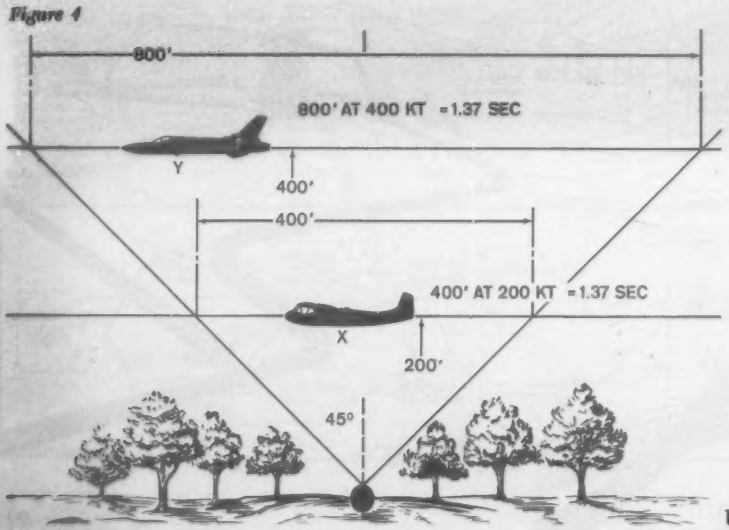
Detected open-sea shipping with a very high degree of accuracy.

Attempts to frustrate the system sensory capabilities proved futile. Deliberate jamming of the radar sensor was not successful and camouflage, though an obstacle to visual/photo sensing, was easily pentrated by the infrared sensor.

Artillery target location, fire adjustment and positive damage assessment were very successfully accomplished by the systems.

Although only two Mohawks were employed in the evaluations, the systems operated with an exceedingly high degree of reliability. They were available for missions 95 percent of the time scheduled. Only 12 missions were cancelled or aborted because of equipment discrepancies. The system was flown a total of 386.10 hours during the three month test period, an average of 64.22 hours per aircraft, per month.

Figure 4



A Merry Christmas From Horatio Frozzleforth

Pierce L. Wiggin

HORATIO FROZZLEFORTH popped an olive into his mouth and turned on his stool to survey the crowded lounge. Surrounded by the Friday afternoon Happy Hour throng at the Fort Rucker Officers' Open Mess, he heard the murmur of many voices and laughter. It was the week before Christmas and everyone was in a festive mood. Frozzleforth drew his eyes from a nylon clad ankle, turned and signaled the bartender for a refill. He tuned in to the conversation of two lieutenants beside him and listened to the accounts of their final checkrides.

Frozzleforth accepted his drink from the bartender, glanced at the shiny new wings on the lieutenants' blouses, and turned to address them. "Pardon me, gentlemen. I couldn't help overhearing your conversation. I take it you've just graduated?"

"Yes sir. I'm Lieutenant Jackson and this is Lieutenant Gridley. We had our graduation exercises this morning."

Frozzleforth turned farther and pushed his star-topped wings toward the lieutenants. "I'm Captain Horatio Frozzleforth. I can remember what a thrill it was to get my wings. Of course, that was many years ago."

"Are you stationed here at Rucker, sir?"

"No, I've been here for the past week attending the USABAAR Aviation Safety Orientation Course. I'm based in Washington. Wish I could tell you what my job is, but it's very hush-hush. I'm sure you understand."

"Will you be going back right away, sir?"

"I hope to leave in the morning. I've offered my services to operations in case they need a chap with my ability to ferry a Mohawk or Chinook up that way."

The lieutenants' eyes widened. "Gosh, sir," spoke one, "you're qualified in the Mohawk *and* Chinook?"

"Certainly, m'boy. The Army doesn't have an aircraft your old dad can't handle."

"Did you enjoy the course, sir?"

"It was a bit of a bore. Rehashing other people's accidents is quite unnecessary for a chap like myself. I'd never commit the blunders they make. Of course, I was able to give them a few tips on investigation techniques and some of the finer points of aerodynamics, based on my broad experience."

Frozzleforth paused for a sip, eyed his audience of two, and found them properly awed. He continued, "After you get some experience behind you, I'd recommend you take the ASO course. You'll need some background to understand the things that are elementary to me, and by then they will have added the refinements I recommended."

"What does the course cover, sir?"

"The usual run of aviation subjects—aerody-

The Army doesn't have an aircraft your old dad can't handle . . .

namical engineering, psychology, physiology, and a smattering of investigation. They reviewed some recent accidents for us and you'd be amazed at the stupid things that caused them. Did you know that we've actually had accidents from aircraft running out of gas?" Frozzleforth slapped the lieutenant nearest him on the back and guffawed. "Can you imagine anything so stupid?"

A waiter appeared and walked briskly through the crowd. Raising his voice over the noise, he shouted, "Call for Captain Frozzleforth! Captain Frozzleforth, please!"

Frozzleforth swung around and left his stool. "Excuse me, gentlemen. Pleasure calls. Cherchez la femme, you know!" He squared his shoulders and strode toward the waiter.

"I'm Captain Frozzleforth, waiter. Where can I take my call?"

"Upstairs, sir. Second booth."

Frozzleforth hurried through the crowd, mounted the stairs, and walked into the open phone booth. He picked up the receiver. "Captain Frozzleforth here!"

"Captain, this is Sergeant Lee in dispatch. You're in luck, sir. We have a Beaver and two passengers that need to get to Washington tomorrow. Lieutenant Gridley will go along as copilot. Would you like to take it, sir?"

"A Beaver, Sergeant? I was hoping you could get me something a little faster. I'm not accustomed to such slow flying!"

"I'm sorry, sir. The Beaver's the only trip we can schedule."

"Very well, Sergeant. I'll take it. Have the passengers meet us for an 0700 takeoff."

Frozzleforth signed his clearance with a flourish. "Here you are, my good man. I'm in a bit of a hurry, if you don't mind."

Clearance in hand, Frozzleforth picked up his Jeppesen case and luggage and hurried out to the ramp and waiting Beaver. He leaned into the cold north wind that whipped his flight suit. A high overcast blocked the sun.

Frozzleforth swung his gear aboard and returned the crewchief's salute. "Are we ready to roll?"

"Yes sir. The lieutenant made a preflight. Would you like to look it over?"

"Won't be necessary, thanks. I'll hop aboard and we'll fire right up. I want to get that heater going. B'r'r'r."

Frozzleforth climbed the left gear into the pilot's seat and slammed the door. He smiled at the lieutenant in the copilot's seat. "Ah, Gridley, a coincidence, what? Didn't know when we met last night we'd be flying together this morning!"

"No sir. This is a real pleasure for me!" Gridley nodded toward their two passengers. "Captain Frozzleforth, this is Major Thompson and Captain Martin."

"How d'you do, gentlemen. Glad to have you aboard." Frozzleforth leaned forward, turned the fuel selector to the forward tank, and flipped the battery switch on.

"Sir, I didn't brief our passengers. I thought I'd best leave that for you."

Frozzleforth grimaced. "Lieutenant, I'm sure

these officers have flown before." He turned to the rear. "Gentlemen, we'll be flying at 5,500 feet and we'll make a fuel stop at Greensboro. Now, if there are no questions, I'll get this beast started and warm it up in here!"

Not waiting for an answer, he shouted "Clear!" and lifted the energizer toggle. He listened as the starter growled into a shrill whine, raised the starter toggle, and turned the mag switch to BOTH. The engine coughed to life. Frozzleforth flipped the radio switches on and waved the chocks away. "Cairns tower, Army 76163. Taxi and take off from the ramp, please."

"Army 163, taxi out for 36 takeoff. Altimeter 29.92. Wind north, 15."

"Roger, altimeter 29.92." He released the brakes, added power and swung into a left turn. Lieutenant Gridley winced as they rumbled to the taxiway and Frozzleforth sped along in drag strip style. As they reached the end of the runway, he ground-looped into runup position and slammed the throttle forward.

"Sir, isn't our cylinder head temperature a little low?"

"Nonsense, lieutenant! You've been exposed to too many books and rules. It's time you cut the apron strings and get with it!" Frozzleforth checked the mags, throttled back, and pressed his mike button. "Cairns tower, Army 163 ready for takeoff!"

"Army 163, cleared to take the runway. Cleared for takeoff."

The tires squealed in protest as he swung onto the runway and slammed the throttle forward. Gridley glanced at the 0° flap indicator and cinched his seat belt tighter.

Frozzleforth shoved the wheel forward, brought the tail high, and held the Beaver to the runway. As they passed the tower he hauled back and they leaped into the air.

He leveled off at 5,500 feet, brought the propeller and throttle back to cruise settings, and trimmed away the control pressures. He glanced at the omni needle, made a 3° correction, then stretched and yawned. "All right, Gridley. You can take over now. I need a snooze." He smiled at the copilot. "After I left you chaps last night, I toured the strip. Wake me if you need any help." He leaned back and closed his eyes. Pleasant thoughts of Wiregrass maidens danced through his mind. His lips curled and he began to snore.

Lieutenant Gridley watched the minute hand of the clock mark the end of the first hour. His eyes moved across the instrument panel and console, then made a sweep outside. He watched the flat terrain move slowly past.

He became aware of an unpleasant odor and sniffed to identify it. Something was burning. He turned to see if one of the passengers was smoking. Their hands were empty.

The odor grew stronger and he saw a tendril of smoke creep from beneath the panel. His eyes swept the engine instruments. All were in the green. Then the flick of the voltage indicator needle caught his eye. If fluctuated across the face of the dial and the smoke grew thicker. Gridley reached for Frozzleforth's shoulder. He shook him. "Captain Frozzleforth!"

"Huh! Wazzat? Wazzat?"

"We have an electrical fire, sir!" Gridley pointed to the voltage indicator.

Frozzleforth came awake and jerked erect. His eyes shot to the wildly moving needle. As he watched, it slammed against the right stop, quivered, and died to zero. The loadmeter needle was also at zero. The smoke and smell dissipated.

"Shall I cut the electric switches, sir?"

"Damnation! Yes." Frozzleforth took control while Gridley cut the switches.

"Are you going to turn back, sir?"

"Turn back? Nonsense! Would you have me disappoint the Pentagon's prettiest secretary?" He outlined an hourglass with his gloved hands and winked at his copilot. "We'll push on and see if she has a friend for you! Get out the sectional charts."

Frozzleforth opened a chart. "Where are we?"

"We should be close to Macon, sir," replied Gridley, staring ahead.

Frozzleforth peered down at the terrain and checked the chart. "Ah, yes. That should be Macon off to the right."

"Are you sure, sir? I thought it would be to our left. The wind seems to have shifted to the northwest and I believe it's stronger."

"Lieutenant, when you've been reading maps as long as I have, you won't need to question the location of any town. It's second nature to me." Frozzleforth banked into a right turn and passed over the town he had identified as Macon. As the town dropped behind, the engine sputtered and died. He quickly switched to the center tank and nursed the engine back to life.

Frozzleforth folded the chart and nodded to Gridley. "All right, lieutenant, you may take over again. Hold this course and wake me in an hour." He leaned back and was quickly asleep again.

Gridley did as he was instructed. They passed

over many small towns, none that he could identify. He was tempted to take the chart from Frozzleforth's hands, but didn't for fear he might wake the sleeping pilot before the hour was up. He watched the clock.

Gridley shook Frozzleforth awake. "Sir, time's up. I have no idea where we are. We should have crossed the Savannah River, but I haven't seen it."

Frozzleforth sat up, opened his chart and looked below. "Didn't you see that city?" he asked, pointing off to the right. "Looks like Augusta to me."

"Do you think it's large enough, sir?"

"Certainly! And there's the airfield, right where it's shown on the map. Lieutenant, I'd suggest you take a course in mapreading as soon as possible."

"Yes sir!" Gridley shrugged and watched the swampy land pass.

Wide awake after his nap, Frozzleforth bored on. Once again, the engine sputtered and stopped. He turned the fuel selector to the forward tank, got the engine running, and recovered his lost altitude. His brow furrowed as he attempted to match the swamp land they were flying over with the map. The towns he passed were small and the few highways were far apart. Sneaking a look at Gridley, he banked ever so slightly to the left for 15°. "The wind must be a little stronger than I'd thought," he mused.

Off to the right in the distance, Frozzleforth could see a dark blue line which appeared to be low hanging clouds. The Beaver droned on and on.

What Frozzleforth had taken to be low hanging clouds soon appeared as a huge lake. "Ah," he thought, "Now I'll be able to pinpoint our position!" As they approached the lake, it became apparent there were two lakes, but no towns. Frozzleforth stared around and looked at his chart. His eyes moved to the dead fuel gauges, all reading empty. He squirmed in the seat and peered outward. "Surely I'll see something soon. I'll fly straight north and either see mountains or a town I can recognize." Pleased with this course of action, he continued to drone onward. They crossed the lakes and continued.

Gridley glanced at his watch and stared out. "Sir, aren't we getting a little low on fuel? We've been on the last tank for more than an hour."

"No sweat, lieutenant. I'm sure we'll see an airport soon!"

At 1130 the engine skilled a beat. At 1132 it coughed, and at 1133 it failed. Frantically, Frozzleforth switched to the center tank and his hand grabbed the wobble pump. He jerked it up and down. There was no response.

"Sir, there's a little field behind us. It's the only one I've seen."

Frozzleforth nodded, dropped the Beaver's nose and banked into a 180° left turn. He called over his shoulder for the passengers to tighten their seat belts. As he rolled out in the opposite direction, Frozzleforth's eyes jumped to the only field in sight. It appeared to be covered with grass and was very short, surrounded by trees that stretched to the horizon in all directions. Over the field at 3,000 feet, he turned out at 45°, glided until he was even with the end of the field, and began a slow turn to base.

"Sir, aren't we just a little high?"

"Have no fear, lieutenant! Your old dad will get us down in good shape!" Frozzleforth pushed the flap lever down and began to pump the flaps. He turned final at 800 feet and pointed the nose to the end of the field. Rapidly, he pumped down the remaining flaps and dumped the nose further.

The Beaver cleared the trees at the end of the field and Frozzleforth jerked the wheel back. They floated the length of the field and the nose passed between two live oaks. Shearing its wings with a shriek of tortured metal, the Beaver dropped to the ground where the main wheels dug into soft ground. The tail went up and they plowed to a stop.

Frozzleforth unstrapped and turned to his copilot and passengers. "I'm sure you gentlemen will all attest to my superior flying skill in making a successful landing out of what could have been a catastrophic accident. I can't imagine why this engine should have used our fuel so quickly. I'm sure the investigation board will find some malfunction in the fuel system!"

His words met a stony faced silence.

After a 15 mile hike, Frozzleforth, Gridley, and their two passengers reached a paved road. They flagged down a pickup truck and were driven to Green Sea, S. C., where Lieutenant Gridley asked for a telephone. He found one in the general store and placed a call to Washington. "I'd like to speak to General Gridley, please."

Frozzleforth's mouth dropped open. "Your father is a general?"

"Yes sir."

"Not the General Gridley who court-martialed a pilot last year for being 10 minutes late?"

"The same, sir."

Frozzleforth sank to an overturned sack of fertilizer. "Merry Christmas!" he muttered.

"This Is Where She Lives"

PILOT: "I was going from the airfield to an across town pad at about 150 feet and 60-70 knots. As I was flying, I noticed the helicopter suddenly felt sluggish. I checked the instruments and saw the rpm and percentage going down. I bottomed the pitch for autorotation and was trying for a city street. I saw trees and pulled a little pitch to try and clear them. I saw that I couldn't, so I pulled all the pitch. We hit the street and skidded to a stop. I got out of the helicopter and tried to walk around to the copilot's side. I could not walk so I lay down in the street."

Question: "How low did your rpm get?"

Answer: "About 5800."

Question: "Did you go directly from the airfield to the pad?"

Answer: "I made one 360° turn over the city."

Question: "Why?"

Answer: "Because I was early and wanted to arrive on time."

Copilot: "We were flying at 150 feet and the pilot made one left 360° turn. Then I heard the audio warning and looked up at the instruments and saw

Loose fuel line quick disconnect caused fuel starvation

crash sense

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the red light. We hit and the next thing I remember is sitting in the helicopter with the roof collapsed, trying to get out. I had no feeling in my hands or feet for awhile, then I undid my safety belt and people helped me out and made me lie down."

Crewchief: "We lifted off and were proceeding across town to the pad. We followed our normal route diagonally across the city. Just before we reached the river, the pilot went into a left turn which continued for two complete orbits. He was bringing the helicopter out of the turn when I heard the sound of the rotor losing rpm. At this point, the aircraft seemed to drop out of the sky. I turned to look at the instrument panel, but at that moment the rotor blade hit a tree on the left side. I don't remember anything after that until I realized I was bent over double with my head between my legs. I tried to get my safety belt open but couldn't get to it. I don't know how I got out."

Question: "Do you know why you were circling?"

Answer: "Not really. The pilot was showing the copilot a house he was interested in."

Question: "Did the pilot say anything to the copilot?"

Answer: "He said something like, 'This is where she lives.' "

Question: "Did he say anything more?"

Answer: "No sir. After the turn no one said anything."

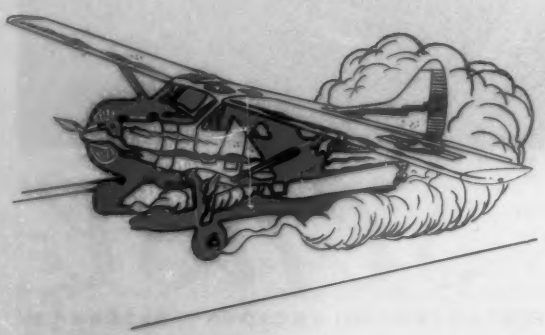
Question: "Were you in a turn when he lost power?"

Answer: "Yes, we were coming out of the second turn when I realized I could see the color of the blades and could hear the rpm slowing."

NCO club manager: "On numerous occasions in the preceding week, I had noticed a helicopter of the same type circling over the club area toward the center of the business district. It was at an extremely low altitude over the club and seemed to go even lower as it went toward town. It seemed to be at near treetop level before again circling and going back in the same direction. On the morning of the accident, a helicopter of the same type again made two swings over the club. As it seemed to near the lowest point in its normal low orbit, I heard two loud cracking sounds and then silence."

The cause of engine failure was traced to an unsecured fuel line quick disconnect which resulted in fuel starvation. The UH-1 was destroyed and three of the four crewmembers aboard sustained major injuries.

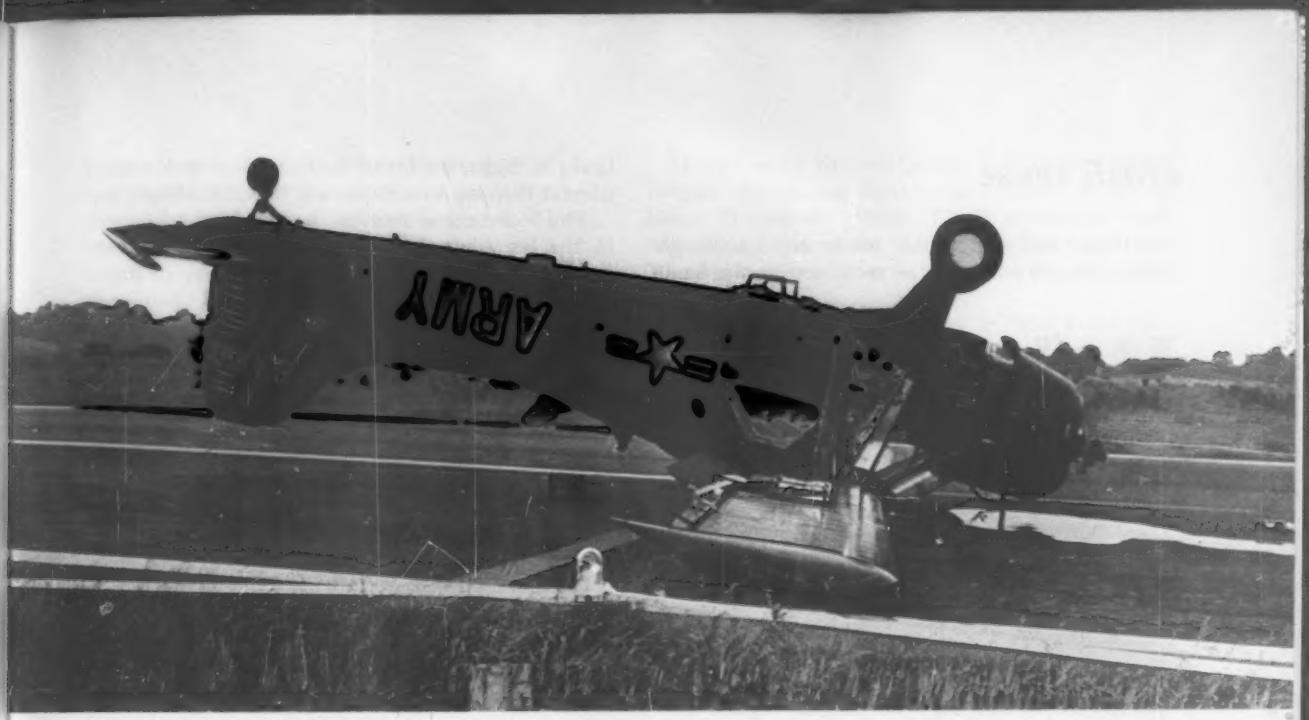
Sudden Stop



It was a Saturday afternoon. The U-6A mission was to drop skydivers. Four drops were successfully completed and the fifth drop was to be the last. The jumpmaster asked the pilot to fly to an altitude of 10,000 feet. The pilot stated that 7,000 feet was the best he could do because of his dwindling fuel supply. Approximately 12-14 gallons remained in the front tank.

During the climb, the pilot closely monitored his fuel supply, switching alternately to the other two tanks to ensure that all available fuel was used. He also had his attention focused on the cylinder head temperature gauge, which approached the red line due to the climb speed and angle. The jumpmaster requested the copilot to hold the brakes on the right wheel so he could brace himself against the right tire while the other three jumpers exited the airplane. The pilot stated that he placed his feet high on the brakes with the insteps of his feet against the toe brakes several minutes before the jump.

After the skydivers left the airplane, a rapid descent was made to the airfield and the Beaver



Beaver was landed with brakes set

touched down 362 feet from the end of the runway. Witnesses heard a short squeal, followed by a sustained squeal of the tires. The U-6 came to rest inverted.

Before arriving at its findings, the accident investigation board carefully considered all possibilities of what might have happened to cause both brakes to lock. The board eliminated the possibility of the pilot landing and then applying both toe brakes and causing the airplane to overturn. He had landed the airplane several times the same day without incident. Both pilots, as well as pilots who flew the Beaver the previous day, stated that the toe brakes were set in a normal, comfortable position and that they did not notice anything unusual about the brakes. The landing was made close enough to the approach end of the runway that abrupt braking was not required.

Hydraulic lines of the brake system were disassembled on the scene in the presence of two board members by two technical inspectors and the unit maintenance officer. The parking brake cable was found securely connected to the actuating lever by the retaining nut and screw. The parking brake was further found to be properly adjusted. Parking brake valves as well as shuttle valves were analyzed and found to be operating normally. No obstructions were present in the hydraulic lines. All four brake master cylinders contained brake fluid and appeared to be operating normally. Brake units on the wheels were found to be correctly assembled and showed no evidence of malfunctioning.

Both wheels of the airplane remained in a locked position after the accident. The left wheel required about 30-50 foot pounds of torque to turn while the right wheel could be turned only with considerable effort—about 200 foot pounds of torque. The board felt that if the hand brake was on during landing, the brakes would initially have slipped and then seized during the ground roll as a result of expansion from inability to dissipate the heat of the resulting friction. Skid marks as well as tire imprints were visible on the runway.

The board's conclusions were:

"The airplane most likely touched down with the parking brake locked, even though there is no concrete evidence to substantiate this fact. All available evidence points to it as the only logical conclusion. Touchdown attitude was very slightly right-wing low to compensate for a slight crosswind from the right front. The right brake was set slightly tighter than the left and the right wheel skidded for 32 feet before the full weight of the aircraft was on the ground, causing the wheel to temporarily rotate rather than skid. Both wheels rotated for 263 feet when the brakes suddenly seized and grabbed, with the rubber on the right tire melting more than that of the left tire.

"As the airplane drew to a halt the tail continued to rise off the ground, the propeller struck the run-

Helping Hand

Assigned a cargo flight mission, the U-9 pilot filed a flight plan, loaded, and taxied to the runway. He called the tower and was given takeoff clearance. He advanced the throttles and started his roll. When the airplane reached 55 knots, he rotated it to a slight nose-up position. At this point, the passenger occupying the copilot seat moved the landing gear handle to the up position and the landing gear retracted. The landing gear handle was immediately returned to the down position but the U-9 had already begun to settle. The pilot attempted to become airborne but was unable to do so because of insufficient airspeed.

The landing gear system was investigated and found to be in normal operating condition. The passenger occupying the copilot seat attempted to help the pilot by operating the landing gear lever without his knowledge or instructions. The attitude of this airplane during takeoff roll is slightly nose high in comparison to other aircraft. This would indicate to a passenger that the airplane was airborne.

Recommend all personnel occupying copilot seats be thoroughly briefed concerning specific duties. This should include instruction concerning operation of any controls or equipment. Unqualified personnel occupying copilot seats should be instructed not to operate any controls.

Passenger raised gear handle during takeoff roll

Cockpit Fog

Pilot: "I picked up the Sioux facing the northwest on the north side of the landing strip and turned left to see if I was clear of the aircraft parked along the south side of the strip. From the parking spot to the takeoff position required moving the helicopter left and rearward about 40 feet.

"When I was over the takeoff spot and facing west I noted the lights fading out. The bubble was fogging up from top to bottom and I started to set it down from the hover. At this point I could still see the ground by looking down near the pedals. I was still at about two feet. I felt what

way twice, and the aircraft nosed over. Although neither the pilot nor copilot recall setting the hand brake in flight, the board feels that this would be a normal reaction to a request to lock the wheels."

The board recommended that toe brakes be used in the air when it is necessary to apply brakes, rather than hand brakes.

appeared to be the right skid touch the ground very easily and continued down. At this point the helicopter made a loud noise and began to vibrate. Seemingly all at once, the bubble shattered and I began to smell gas. I unbuckled and rushed from the Sioux. It was burning by the time I got out through the shattered bubble.

"Prior to takeoff I had checked weather. It was 1,500 feet and 5 miles. I was using the gas tanker lights for takeoff, plus a ground guide with lights. There was only a very light mist during the time the accident happened.

"I was using the navigation and beacon lights without the landing light when I picked up to the hover. During my runup, I had turned on both blowers and cleared the bubble before picking it up. The blowers were still on when the accident happened."

The OH-13H was destroyed by fire. Condensation on the inside of the plexiglass blocked outside visual references. Rapid condensation can form, even with the use of blowers, under conditions of high humidity and low temperature. This condition is particularly hazardous at night.

Too late with pitch

Experience

It was an OH-13S maintenance test flight. Two equalizer links and one pitch change link had been disconnected to adjust the main rotor blade track. The pilot made an autorotation and noticed the rotor rpm was low.

After a power recovery, he climbed to traffic pattern altitude and started another autorotation. Both he and the observer concentrated on the rotor tachometer. He slowed the helicopter to between 50 and 60 knots indicated airspeed and again the rotor rpm was low. Approximately 40 or 50 feet above the ground, he flared to increase rotor rpm and saw it build slightly. Suddenly, he noticed that he was close to the ground and applied pitch and power. It was too late. The Sioux struck the ground, bounced, and came to rest with the bubble shattered and the tail rotor system under the main rotor hub assembly.

crash sense

Pilot error? No doubt about it. He started the autorotation at traffic pattern altitude and concentrated on watching rotor rpm until it was too late to recover. Why? The investigation board found the answer in his 759's. This pilot had a grand total of 5 hours of OH-13S flying during the previous 90 days. Paragraph 4a (2), TB AVN 23-16, calls for test pilots to be the most experienced individuals available.

No chip detector warning light

Without Warning

With a pilot, instructor pilot, crewchief, and nine passengers aboard, the CH-34C leveled off and power settings were reduced to normal cruise. Approximately one minute later, the crew and passengers smelled a strange odor which was described as sweet like tobacco. The pilot told the crewchief to check the battery. It was functioning normally. Not knowing for sure what caused the odor, the pilot chose to turn the battery switch off. (It was

later determined the smell probably came from smoke emitted by numerous industrial plants in the area.) Approximately 30 seconds later the engine coughed and rapidly lost power.

The instructor pilot immediately took control and attempted to regain power while autorotating. Unable to regain power, he continued the autorotation. The crewchief told the passengers to tighten their seat belts. The instructor pilot flared just above the treetops and zeroed his airspeed. He continued pulling pitch until he had full pitch and the Choctaw began settling into the trees. The tail pylon made first contact with the trees. Then the fuselage hit and pushed over two trees, struck a third tree, and slid down, striking the ground.

Major injuries were sustained by the crewchief and one passenger. Another passenger had minor injuries. The cause of engine failure was materiel failure of the connecting rod bearing and connecting rod of the No. 5 cylinder, due to oil starvation at the bearing.

There was no prior warning of engine failure. The instructor pilot's quick response and proper execution of engine failure emergency procedures over trees probably saved the lives of his passengers.

If an engine magnetic chip detector and cockpit warning light had been installed, this accident could probably have been prevented.

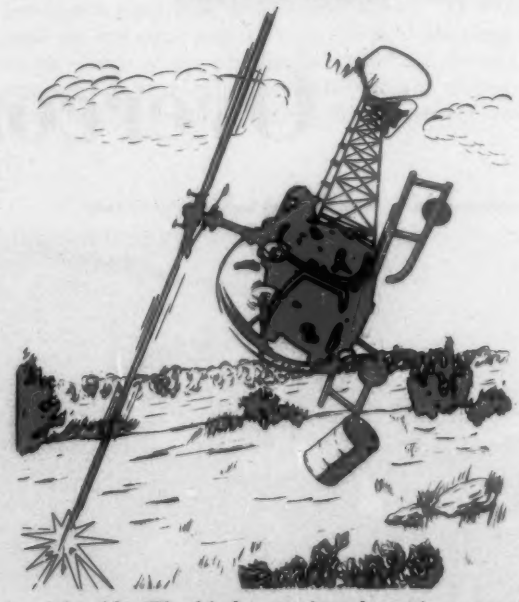
Drum Beat

Pilot: "At 1430 I left in an OH-13E with a passenger for 1½ hours of proficiency flying. I flew NE from the airfield toward the NW portion of the reservation and made several approaches to landing strips. I followed the reservation boundary up the west side and across the north, going over the reservation several times. At about 1520, I began several approaches to a trail junction in an old range area. On one takeoff, I noticed several 55-gallon drums near another trail about 600 meters south of where I had been landing.

"I decided to pick up one of these drums to move it to a clear spot to practice hovering; that is, setting the drum up with a skid, then tipping it over and setting it up again. I made an approach to the trail near the drums and, from a hovering position, selected one which had its open end angled toward the trail. There was a small tree about 7 feet tall, about 10 feet to the right of the drum. I planned to hover to the right front, pick up the drum, then hover back to the left away from the tree. The main rotor blade would clear the tree in this fashion.

"I hovered to the drum and placed the toe of the right skid into the open end about 6 inches. I lifted the drum slightly and it felt light enough to pick up, so I slipped the skid about 18 inches into the drum and lifted again. The drum came up but the helicopter began to slip to the right toward the tree. Still feeling that I could lift it, I applied power and collective to lift it over the tree. At this time the drum pulled the Sioux completely down on the right side and the right skid hit the base of the tree.

"Almost immediately, the main rotor blades struck the ground and the helicopter flipped onto



its right side. The blades continued turning several revolutions and stopped, killing the engine. I asked the passenger if he was hurt and got a negative reply so I told him to get out. I cut the switches, mags, pulled the fuel cutoff knob, grabbed the fire extinguisher, and climbed out the right side of the

crash sense

bubble. The doors were not on the ship and the right side was about 18 inches off the ground. There was some smoke coming from the aft part of the engine near the oil reservoir, so I sprayed that with the fire extinguisher. The fuel tank had not ruptured so there was no fire. The time was about 1530."

Drum wouldn't lift, so . . . OH-13 "settled"

The area in which the pilot made his approach was in a small brush type area. The initial approach was to a clearing approximately 30 feet wide surrounded by scattered bushes. He then hovered the helicopter approximately 40 feet to the drum.

The [illegible] attempted to pick up the [illegible] generally in a line with [illegible] to height on [illegible] it was necessary to [illegible] some of these bushes.

Some [illegible] determined to be continued [illegible] pitch after the helicopter had [illegible] to the right toward the bushes. Contributing causes were the apparent failure of the drum to free freely with the application of power, poor judgment in the pilot's selection of an area for retrieving a drum for hovering practice, and failure to conduct a ground reconnaissance of the area and physically check to see if the drum was free.

Aviators should not subject passengers to hazardous maneuvers, other than those required for operational missions.

Overconfidence

Overconfidence, crosswind, and high density altitude

Instructor pilot: "As I entered a demonstration autorotation, I saw the wind tee indicating 90° to the right of my landing direction. I made a modified flare at 50 feet and applied pitch at 15 feet. I applied cushioning pitch at 2-3 feet and touched down in level attitude with about 5-6 knots groundspeed. I saw that we were in a slight left turn and applied full right pedals, following with left cyclic. When it became apparent that the turn would progress beyond the 90° point, I also applied forward left cyclic."

The helicopter slid 41 feet on the left skid, spun 180° to the left and continued to slide. The right skid dug into the ground and the helicopter came to rest on its right side.

The investigation board determined that the cause of this accident was the instructor pilot's overconfidence in his ability to perform touchdown autorotations in a crosswind and his misuses of cyclic control. The crosswind and density altitude of 3,570 feet were considered contributing factors.

Emergency Procedures — Wrong Way

A U-6A pilot was assigned a round robin passenger flight. The outbound flight to drop off the passengers was uneventful and the Beaver was refueled for the return flight. The pilot took off, climbed to 5,000 feet, and flew toward his home station.

Flying hood, the pilot was not looking out. He quickly checked the engine instruments when the copilot told him that oil was covering the windshield. At that time, all engine instruments were in the green. He called an en route station and reported that they were returning to the original destination because of a blown prop seal.

As he turned back, the pilot saw that he was down to 4,000 feet and added power to climb without increasing rpm. The flow of oil from the engine increased and they began to smell smoke. The pilot rechecked the engine instruments and found them in the red. He decided to shut down the engine and make an immediate forced landing.

Unable to find any good fields to the left and unable to see ahead, the pilot asked the copilot if he could see any good fields to the right. The copilot stated there were several large areas and that because of their high altitude, a particular field was not selected. They flew a long downwind leg, planning for a right turn to base, and a right turn to final. Because of reduced visibility, the copilot guided the airplane through a gradual turn to final.

The pilot took control on final and continued the approach to the general area selected. He still had not had a good look at the fields ahead. On short final, he saw some hay stacks in the field ahead and made a turn of approximately 20-30° left to what appeared to be a better field. Altitude and airspeed were insufficient to complete this maneuver and

Improper emergency procedures

the copilot yelled that trees were coming up on the right. The pilot rounded out into three-point attitude and the right side of the Beaver struck a hedgerow. The airplane veered right approximately 210° and came to rest on the collapsed right gear and wing.

The investigation board found that the primary cause of this accident was failure of the pilot to follow the emergency procedures outlined in the flight handbook, which called for placing the propeller in high pitch to prevent the loss of engine oil. This pilot had been rated in U-6A airplanes for more than five years. Unfortunately, his experience in the Beaver was not matched by his knowledge of handbook emergency procedures.

Emergency Procedures — Right Way

Pilot: "I departed on a round robin flight with three passengers aboard and made an uneventful flight to our destination. Wind was south at approximately 10 knots and I landed on runway 18. During the landing roll, I noticed a slight swerve to the left, but thought it must have been caused by momentary wind shift or slightly relaxed rudder pressure.

"When we returned to the home field, the surface wind was from 240° at 10 knots and I landed on runway 32. As we touched down in a slight right wing-low attitude to correct for the crosswind, the airplane made a skip bounce and swerved to the left. I applied right brake and rudder, but the left turn continued. When it became obvious I was going to leave the runway, I applied full power and started a go-around. I also applied right aileron to raise the left gear, decrease the drag, stop the turn, and allow a relatively straight takeoff.

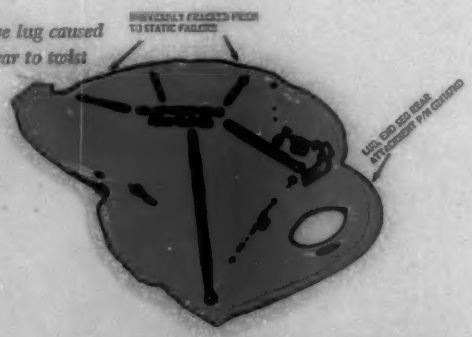
"When we became airborne again, I checked the left gear and saw it was twisted outboard, to the left of normal. I made two flybys past the tower at 100 feet and the tower confirmed my observation. At that time, I declared an emergency. The tower asked if I had enough fuel to wait for the runway to be foamed and I replied that I had.

"While we were flying around waiting for the runway to be foamed, I briefed the passengers on their respective emergency procedures and told them what to do as we contacted the runway and when the airplane came to a stop. I made sure that all safety belts were fastened and shoulder harnesses in place and snug. We secured all loose items, including hats, glasses, and books. I asked my passengers if they would prefer to bail out, but they elected to remain with the airplane.

"When the tower advised me to start my approach, I flew the airplane at 60 knots approximately 2-3 feet above the runway until I reached the foamed area. I cut the power and we landed on the foam in three-point attitude. The airplane veered to the left but I was able to hold it on the runway with rudder and brake. As we came to a stop, I cut the mixture and switches, and ordered my passengers out."

The cause of this accident was materiel failure of the left main gear rear attaching lug. This lug was forwarded to a laboratory for analysis and several areas of insufficient weld penetration were found (see photograph).

Defective lug caused U-6A gear to twist



Sick Engine Autorotation

Number three in a V formation, a UH-1B was returning from a field exercise when the pilot felt a vibration in the floor and saw the EGT above 700°. He reduced power to enter a needles-joined autorotation and turned approximately 110° to the left. At 50-60 feet, he decelerated and applied power. The engine failed and rotor rpm dropped. Realizing he had low rotor rpm, the pilot decided to touch down with the airspeed he had, 30-40 knots, and use the remaining rpm to cushion his landing. The Huey touched down at approximately 30 knots and the aft portions of the skids dug a 6 inch groove in the ground. The skids broke away and the helicopter slid on its belly for approximately 30 feet, turned right, and stopped.

The cause of this engine failure will never be definitely determined because the engine was rebuilt and returned to service before it could be given a teardown analysis. Fuel and oil samples were taken and an excessive amount of sediment was found in the samples of the main fuel cell and the main fuel filter. The oil sample was submitted for spectrometric analysis and showed abnormal wear of iron and copper.

The investigation board recommended that all pilots be made aware of the possibility of complete engine failure when making precautionary landings due to engine malfunction. Under these circumstances, the pilot should keep himself in position to make a safe landing without the engine. Past helicopter accident experience shows many cases of major accidents where pilots elected to recover with power from autorotations after engines malfunctioned. In nearly all these cases, the engine failed completely and the pilots did not have enough rotor rpm or altitude to successfully complete autorotative landings.

Engine failed during power recovery

crash sense

Piston Pin

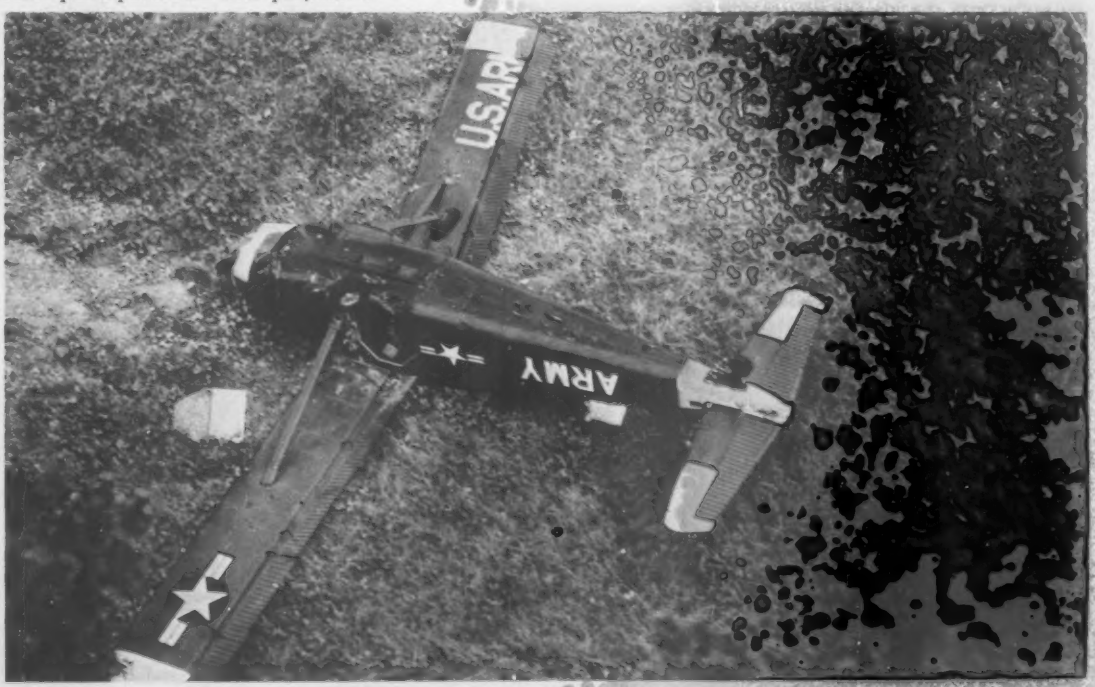
Instructor Pilot: "While approximately 3½ miles northeast of the airfield, the U-6A vibrated and shuddered violently. All engine instruments were within limits. The airplane was shaking so violently that I was almost unable to hold the control column. I had been using 28" Hg and 1800 rpm. I saw that I had lost two inches of manifold pressure and it was continuing to decrease. I applied more throttle, but there was no increase in manifold pressure. When the vibration started, we were at or near 1,100 feet. I made a call to the airfield tower and told them I had engine trouble and was making a forced landing. The tower operator asked my location and I gave it. I then told both student pilots to tighten their seat belts and shoulder harnesses. We turned off the mixture, switches, fuel, etc.

"I had seen two possible areas for touchdown. As we neared the area to the north, I saw two or three power lines in our flight path and turned left into the remaining area. I had put down slightly more than climb flaps at 600 feet indicated. The field was contoured and terraced. It had a small crown that offered the flattest surface. I was trying to touch down on the crown area.

"We landed and hit a gully which I had not seen from the air because it was covered with kudzu vines. As we crossed the gully, the gear and a lower portion of the engine cowling hit the lip of the gully and we nosed over. I asked if anyone was injured and told the students to get out as quickly as possible. The front doors were jammed so the student in the pilot's seat and I went between the seats and through one of the rear doors. Gas fumes were strong and I saw fuel pouring from the left wing root through the overflow outlet."

A teardown analysis of the engine proved that failure was caused by a fatigue fracture of a piston pin. It was further determined that the pin was made of steel that did not meet required specifications.

Failed piston pin did not meet specifications



Municipal Day Celebration

"Dust-out"

An OH-23B pilot left his home field to carry a professional football player to a municipal day celebration and present a static display of the helicopter as part of the celebration. The passenger was delivered to a baseball field behind city hall, then the pilot flew the city photographer around the field and returned.

After the static display, the pilot picked the helicopter up to a hover and made a fast forward turn to the right. This brought the Raven over a clear area and caused a considerable amount of dust to be blown in the air. He applied rear cyclic and the helicopter struck the ground, breaking off the right front skid and damaging the tail rotor. He maintained throttle and collective pitch setting, lost directional control, and the helicopter made two or three complete circles to the right. At that point, he reduced throttle and the Raven hit the ground, rolling on its right side. The main rotor blades shattered, with pieces flying as far as 200 feet away from the aircraft. Uninjured, the pilot got out and disconnected the battery.

The investigation board questioned witnesses and reviewed a motion picture film of the flight taken by a bystander. After considering all evidence, the board determined that the pilot:

- Was not proficient in type and model aircraft in accordance with AR 95-4, para 8a and b.
- Made an unnecessary forward turn at an excessive speed, flying near or beyond aircraft limitations.
- Lost control of the helicopter at a critical point during flight over an area previously known to present a dust hazard.
- Overcontrolled and made a rear movement of the cyclic, causing the helicopter to strike the ground.
- Failed to immediately perform the necessary emergency procedure outlined in the -10 handbook for tail rotor failure.

crash sense

Parachute Vs OH-13s

Camouflaged parachute canopies were used to camouflage the bubbles of parked OH-13 aircraft.

Pilot: "I removed the parachute canopy from the left side of the helicopter and gave it to either the crewchief or observer. I did not see what was done with it.

"I made a short preflight and started the engine. After the engine was run up and the observer was strapped in, I lifted the Sioux to a hover. When I had it stabilized, I lifted it to approximately a 10 foot hover to clear the bushes in the area, and started to move forward. At this time, I saw the chute canopy start to flutter and lift off the ground at about 45° to my left front. I realized it would go into the rotor, so I attempted to put the helicopter back on the ground. Before I could get down, the canopy came up and was struck by the main rotor blade. I was approximately 3 feet off the ground at that time.

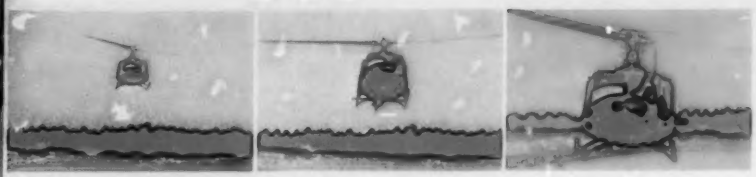
"The Sioux flipped on its left side, the main rotor struck the ground, and something broke the bubble. As soon as it stopped moving, I started to turn off switches. I heard fuel pouring down from the upper tank and decided to get out immediately.

Camouflage cover blew into main rotor blade

I unbuckled, got out, and helped the observer out.

"The camouflaged parachute canopy was wet from a recent rain. This made it more difficult to see lying on the ground."

The accident investigation board recommended that all personnel working in or around helicopters be cautioned about the dangers involved in leaving unsecured equipment and material in helicopter operational areas.



Expansion

Colonel Jonathan R. Burton, Director of R/W Tng, USAAVNS, Fort Rucker, Alabama

NOT ALL IS the same at the home of Army Aviation. Wiregrass International (Hanchey Army Heliport) is changing its point of emphasis and numbers of graduates. Conflict in Vietnam has generated greatly increased requirements for "fling wing" operators and aircraft. The airmobile concept has found more universal acceptance and the Army Aviation School is adjusting to the expanded loads.

Present initial entry classes at Fort Rucker total 96 students. These will be expanded to 175 by January 1966 and 290-man classes by May 1966. Total output per year at the 290-man level will be 3,480, which will be reached in 1967. Plans and instructor training to assume these loads are presently underway. Around 100 potential instructor pilots are in training at "Fort" Hanchey on any given day.

The initial entry rotary wing course has been changed so that 16 weeks are taught at Fort Wolters, Texas, and the last 16 weeks at Fort Rucker, Ala. Called 16/16, this concept has caused an adjustment in flight hours. The old 12-week course at Wolters found the student flying 85 hours in 12 weeks in the Hiller OH-23. In the future the fledgling "hub head" will spend 16 weeks and 110 hours at Wolters. Most of this instruction will soon be in the Hughes TH-55, off-the-shelf trainer. Since more hours are available, additional instruction will be given in more advanced techniques in confined areas, pinnacles, low level navigation, formation flying, etc.

On arrival for his tour at Fort Rucker, the student will no longer go directly to a utility type (UH-19) contact checkout. Instead he will immediately receive an 8 week tactical instrument training course. His aircraft will be the Bell TH-13T, which is an off-the-shelf instrument trainer similar to a Bell 47G-3B-1.

Here the emphasis of the 50-hour instrument course, in addition to being a lifesaving one, will produce a helicopter pilot who can fly under instrument conditions in the combat area. Basic instruments will teach the student to fly under the hood. Advanced sessions (last 4 weeks) will stress the navigation required to fly instruments in combat areas. Field NDBs and GCAs will be used, and several routes around Hanchey are being developed. Basic instrument training is to be taught at Shell by contract; advanced tactical instrument is to be taught at Hanchey by military instructors. The Q Course has also been changed from Wolters to Rucker and will be taught at Shell using military and civilian instructors.

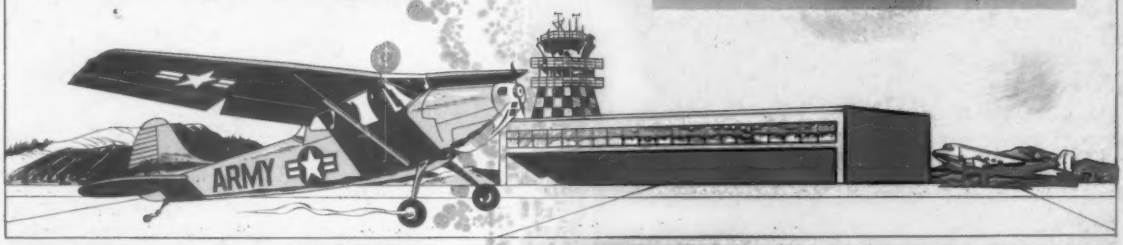
As the student finishes his 8 week tactical instrument training, it is planned for him to receive a tactical instrument ticket (when this concept receives approval from higher headquarters). The concept also envisions a figure 8 approach to a NDB down to a 100 foot ceiling with 1/4 mile visibility and a 50 foot, 1/8 mile minimum for helicopters to a field GCA. A student showing sufficient progress will also be put up for a standard ticket at check-ride time. This will include an ILS and VOR approach. Only ADF and GCA are required for the tactical ticket.

Following the 8 week instrument course the student will receive his 50 remaining hours of the course in the UH-1, which will be based at Lowe AAF. The first 25 hours will be in the Department of Rotary Wing for a UH-1 checkout. The last 25 hours in the UH-1 will be in the Department of Tactics. This course will apply the knowledge gained previously plus offering a 3 hour gunnery course. The final tactical phase will emphasize field work, such as sling loads, formation flying day and night, low level navigational flights, radiological survey, escort missions, etc.

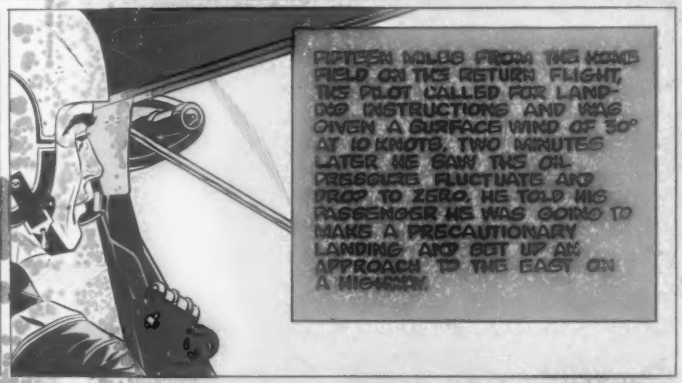
These are some of the changes being developed at Fort Rucker. The aim is to better equip the new rotary wing pilot for duty in Vietnam. Phase-out of the UH-19 and acquisition of the TH-55 and TH-13T trainers have cleared the way for a straight 50 hour flying block of instruction in the UH-1 just before graduation. We believe the presently planned approach will provide an even better qualified pilot to support the Army's expanding role in airmobility.

STACKED DECK

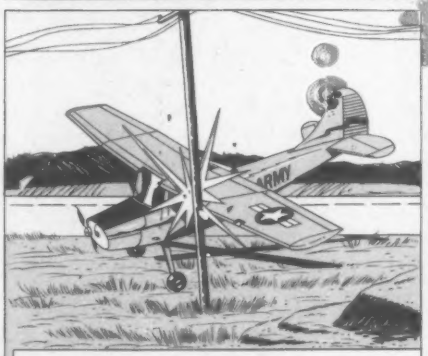
AN O-1A, WITH PILOT AND PASSENGER ABOARD, MADE A THREE HOUR CROSS COUNTRY FLIGHT AND LANDED. THE PILOT WAS UNABLE TO MAKE A RIGHT TURN ONTO THE PARKING RAMP WITHOUT THE ASSISTANCE OF HIS PASSENGER ON THE REAR BRAKE PEDALS.



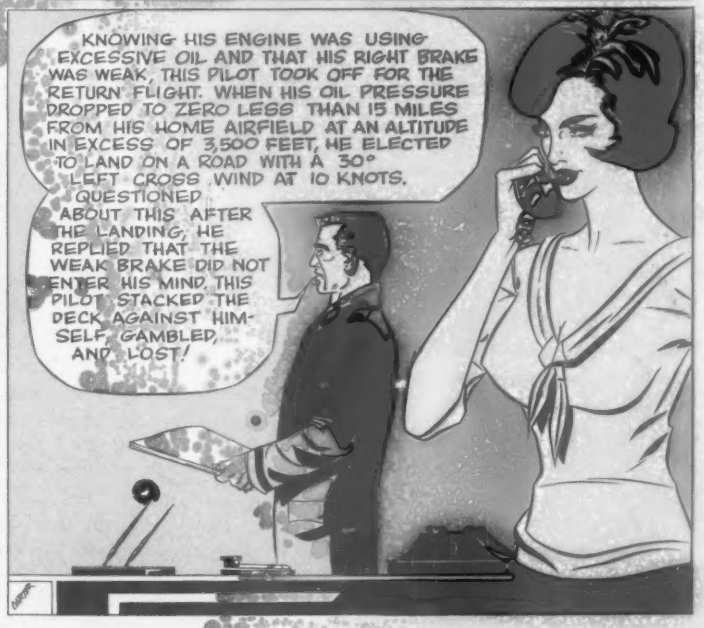
WHEN THE AIRCRAFT WAS SERVICED, THE ENGINE REQUIRED 5 QUARTS OF OIL.



FIFTEEN MILES FROM THE HOME FIELD ON THE RETURN FLIGHT, THE PILOT CALLED FOR LANDING INSTRUCTIONS AND WAS GIVEN A SURFACE WIND OF 30° AT 10 KNOTS. TWO MINUTES LATER HE SAW THE OIL PRESSURE FLUCTUATE AND DROP TO ZERO. HE TOLD HIS PASSENGER HE WAS GOING TO MAKE A PRECAUTIONARY LANDING AND SET UP AN APPROACH TO THE EAST ON A HIGHWAY.



THE AIRCRAFT LANDED, ROLLED 200 FEET, AND SWERVED TO THE LEFT. THE PILOT WAS UNABLE TO STOP THE SWERVE AND THE LEFT WING STRUCK A TELEPHONE POLE. THE AIRCRAFT PIVOTED AROUND THE POLE AND THE RIGHT GEAR STRUCK A FENCE POST AND WAS SHEARED.



KNOWING HIS ENGINE WAS USING EXCESSIVE OIL AND THAT HIS RIGHT BRAKE WAS WEAK, THIS PILOT TOOK OFF FOR THE RETURN FLIGHT. WHEN HIS OIL PRESSURE DROPPED TO ZERO LESS THAN 15 MILES FROM HIS HOME AIRFIELD AT AN ALTITUDE IN EXCESS OF 3,500 FEET, HE ELECTED TO LAND ON A ROAD WITH A 30° LEFT CROSS WIND AT 10 KNOTS.

QUESTIONED ABOUT THIS AFTER THE LANDING, HE REPLIED THAT THE WEAK BRAKE DID NOT ENTER HIS MIND. THIS PILOT STACKED THE DECK AGAINST HIMSELF, GAMBLED, AND LOST!

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AVIATION ACCIDENT RESEARCH